400

AN IMPROVED AND ENLARGED EDITION

OF

BIDDLE'S

YOUNG CARPENTER'S ASSISTANT;

BEING

A COMPLETE

SYSTEM OF ARCHITECTURE

FOR

CARPENTERS, JOINERS, AND WORKMEN IN GENERAL,

ADAPTED TO THE

STYLE OF BUILDING IN THE UNITED STATES.

REVISED AND CORRECTED, WITH SEVERAL ADDITIONAL ARTICLES, AND FORTY EIGHT NEW DESIGNS, CHIEFLY OF FULL SIZE WORKING DRAWINGS OF MODERN FINISH, IN DETAIL.

PARTICULARLY ADAPTED FOR COUNTRY USE.

BY JOHN HAVILAND, ARCHITECT.

Philadelphia;

PUBLISHED BY M'CARTY & DAVIS—171 MARKET STREET.

1833.

PREFACE

TO THE IMPROVED EDITION.

In offering to the Public a new Edition of the Young Carpenter's Assistant, it will be proper to make a few general remarks on the original object of the author, and the nature of the improvements which are now effected. When this work was first published, nothing on Architecture had previously appeared in this Country. All foreign authors adapted their examples and observations almost entirely to the style of Building in their respective countries, which in many instances differed materially from ours. Hence, to the American Student, a work embracing the practical and theoretical knowledge of Architecture, adapted to the peculiar circumstances of this country, had become a great desideratum; in supplying of which, none succeeded better than the Young Carpenter's Assistant.

The rapidity with which every Science is advancing in this country, sufficiently indicates the great improvements necessarily made in the most important of all subjects, as it regards our health and convenience,—the proper construction and building of our houses. Whence, the original work, published now sixteen years ago, must consequently be found considerably deficient in information and examples, and a new edition has been in great demand.

For the revisal and correction of this new edition of the Young Carpenter's Assistant, the Publisher is indebted to the care and professional knowledge of Mr. John Haviland, Architect, whose great practical experience so pre-eminently enables him to adapt the work to the present time, and to impart much additional information and valuable matter on each subject.

A series of forty-eight New Designs and beautiful Specimens, chiefly of full size, accompanied with their Working-Drawings, and parts explanatory of the Modern Finish, in detail, have been introduced by Mr. Haviland for the immediate application of the Practical Carpenter and Builder. They are calculated to instruct him either in the designing or execution of Dwelling-Houses, Banks, Prisons, Doors, Windows, Railing, Skirting, Cornices, and Marble Mantles. The whole is particularly adapted for country use; and, as nothing has been omitted which can tend to his information, it is presumed that this will be rendered the most complete and useful book to the young workman.

Philadelphia, *July*, 1833.

PREFACE TO THE FIRST EDITION.

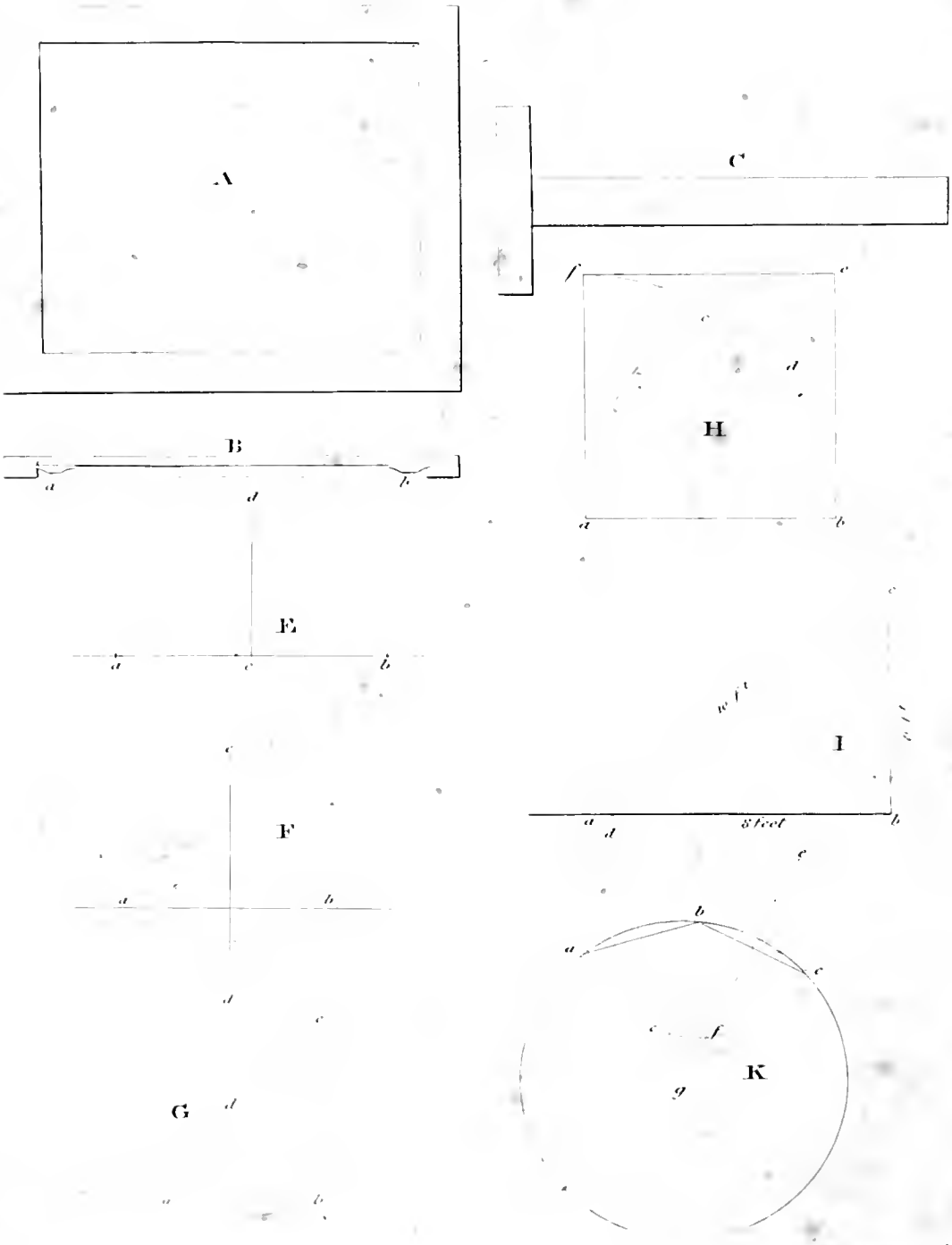
Having been for some time past in the practice of teaching the Rudiments of Architecture, I have experienced much inconvenience, for want of suitable books on the subject. All that have yet appeared, have been written by foreign authors, who have adapted their examples and observations almost entirely to the style of building in their respective countries, which in many instances differs very materially from ours. Hence the American Student of Architecture has been taxed with the purchase of books, two-thirds of the contents of which were, to him, unnecessary; when, at the same time, in a large and expensive volume of this kind, he has not always been able to find the information wanted.

Nothing on Architecture has heretofore appeared in this Country, where the field for improvement in every useful art and science is, perhaps, more extensive than in any other. Why there has not, appears to me matter of surprise, whilst we have among us men of talents, fully acquainted with the subject; some of whom are also men of leisure. Perhaps they have not viewed the subject in the same light, or given to it the same degree of importance, that I have. For my part, I can conceive of few objects of more consequence, in a new and improving country like our own, as it regards our health and convenience, or as it may gratify the fancy, than the proper construction and building of our houses: whence I conclude it a matter of interest, not only meriting the attention of every Carpenter, but of every man who has time and inclination to devote to the study, and more especially such as may have occasion to build.

Under the influence of these impressions, and at the solicitation of some of my friends, I have been induced to this undertaking. How far I have succeeded, I leave to those who are capable of judging. No doubt they will discover in it some imperfections; yet surely it will not be considered as arrogance in me to conclude it better adapted to the peculiar circumstances of this Country, than any foreign production of the kind. I have not, from prejudice, omitted any thing useful contained in the books already published on the subject: neither have I, on account of their authority, or from partiality, retained any thing I apprehended useless to the young Carpenter of the United States. The proportion of the four Orders I have taken from *Pain's* Works, with but little variation; and, for some of the Geometrical Problems, I am indebted to *Peter Nicholson*, whose Works are held in deserved estimation. In stairs, and framing roofs, I have given the most recent improvements of this Country; and have endeavored, through the whole, to adapt the explanations to the capacities of Learners; which accounts for a minuteness that may possibly appear tedious to those who need no instruction.

Philadelphia, 1805.

PLATE 1.



THE

YOUNG CARPENTER'S ASSISTANT.

AS this work is intended for the Student in Architecture, it seems requisite to give some directions, respecting the necessary instruments for drawing, &c.

Fig. A, Plate 1, is a representation of a draught-board, to which the paper used in drawing is to be fixed. This board is composed of a frame of mahogany or other hard wood (the outside edges of which should be exactly straight and square) with a panel about half the thickness of the frame, to be let in from the back, and to lie in a rabbit in the frame; there to be secured by small wooden buttons. Fig. B is a section of the board, *a* and *b* are the buttons by which the panel is kept in its place. Eight or ten of these may be necessary. The panel should be clamped, to remedy any disadvantage attending the shrinking of the wood. It would not be amiss, before making the draught-board, to ascertain the size of the paper to be used, and make the panel about 2 inches less each way than the sheet. In applying this board to use, lay the paper on a table, and moisten one side of it with a wet sponge; place the board upside down near it; take out the panel and lay it on the paper, one inch of which will extend beyond the panel all round; take hold of the edges of the paper, and lift them both into the frame; fasten the buttons and dry the paper by the fire; when it will be smooth as a drum-head.

Fig. C is the T square, the blade of which should be long enough to reach nearly across the draught-board, and should not exceed three-sixteenths of an inch in thickness. Similar in form to this a bevel may be made, with the blade movable on a centre in the stock. The application of these, in drawing parallel lines on the draught-board, is so obvious that I need not describe it.

In choosing a case of mathematical instruments, attention should be paid to its containing the scales of equal parts on the thin ivory or box-rule; as, in drawing the four Orders of Architecture, they are all proportioned by such a scale; which indeed is the case with almost all Architectural drawings; and with a little attention the Student will generally be able to find a scale ready made, with greater accuracy than he would be able to make one himself. The case should also contain a bow-pen or compass, a useful instrument for drawing very small circles. With these, a small piece of gum elastic for rubbing out black-lead lines, a stick of Indian ink, two camels'-hair pencils, one large, the other small, and a black-lead pencil, will constitute the instruments necessary in learning Architectural drawing. It may be proper to observe, that no kind of ink should be used except Indian ink. For drawing lines, this should be dissolved some time before it is to be used; but for shading, it is best to drop a little water on a plate or saucer, and rub the stick of ink in it till it is of a proper shade.

I shall now proceed to explain some of the most useful geometrical problems, which every Carpenter ought to be acquainted with.

To raise a perpendicular or plumb-line, from a given point on a straight line:

Let *a b*, fig. E, be the line, and *c* the point given, from which the perpendicular is to be drawn. Take any space with the compasses at random, as *c b*; with that space set off *c a* and *c b*; then place one foot of the compasses in *a*, and extend the other beyond *c*, and describe a small part of a circle, as at *d*; then, with the same extent of compasses, place one foot in *b*, and make a part of a circle to cross the other at *d*; through the intersection of these circles, a line drawn to *c*, will be perpendicular or plumb.

From any given point over a right line, to let fall a line which will be perpendicular to that right line:

Let *c*, fig. F, be the point given; and *a b* the right line. With one foot of the compasses in *c*, extend the other foot so as to describe the arc or part of a circle *a b*; place one foot of the compasses at the intersection of this arc with the right line at *b*, and extend them so as to describe a small arc at *d*; with the same extent of the compasses place one foot in the intersection at *a*, and cross the arc at *d*; draw a line from *c*, through the intersection of the arc at *d*, and it will be perpendicular to the right line *a b*.

On the end of a right line, to draw a line which will be perpendicular, or at right angles with that right line:

Let *a b*, fig. G, be the right line; at some point over this line, as at *d*, place one foot of the compasses, and extend the other to the end of the line at *b*, and describe the circle at *a b c*; through the intersection at *a*, and the centre at *d*, draw the line *a d c*; from *c* draw the line *c b*, which will be perpendicular to the line *a b*.

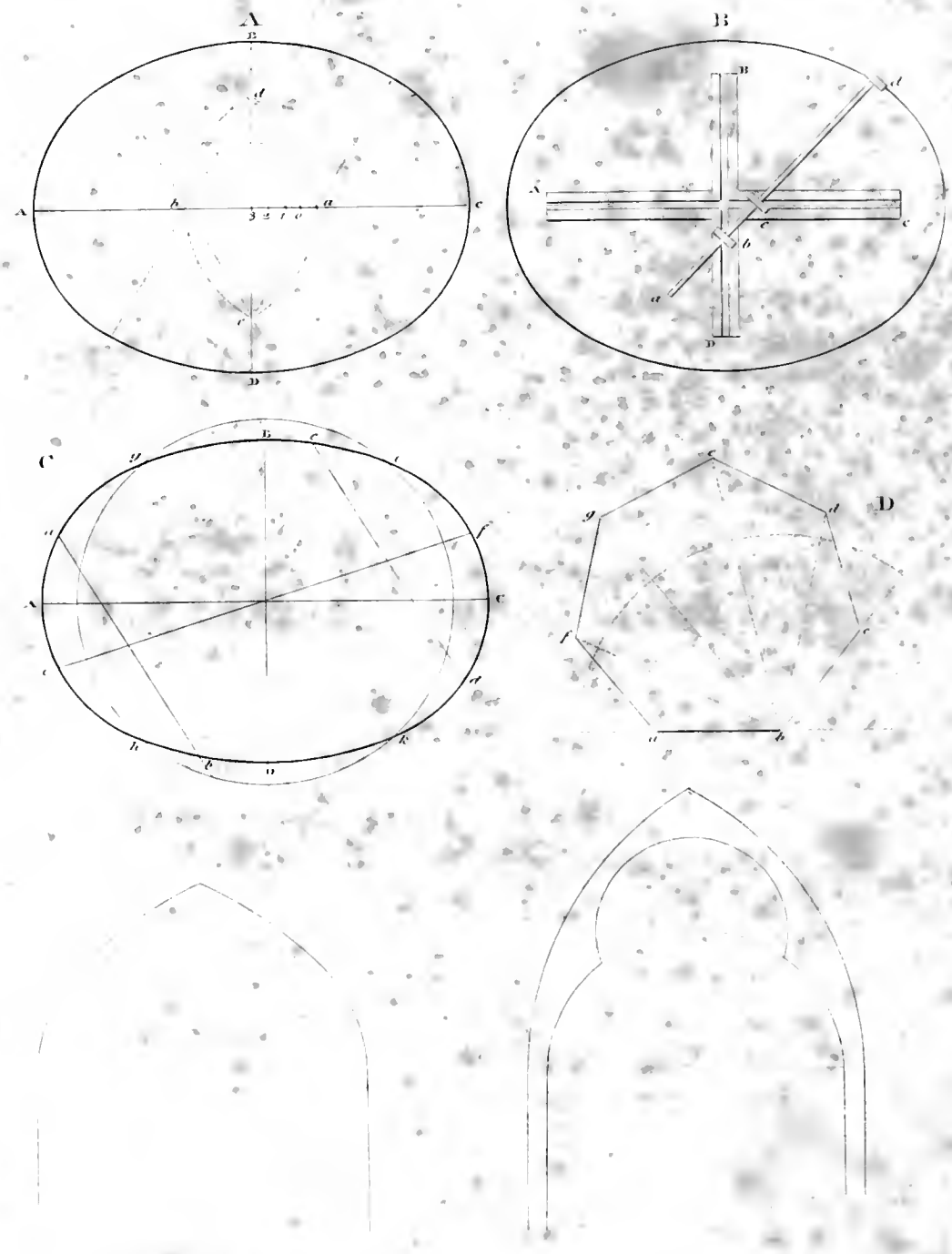
To describe a square, whose sides shall all be equal to a given right line:

Let *a b*, fig. H, be the line given; with one foot of the compasses on *a* describe the arc *f c b*; then with one foot in *b* describe *a c c*; divide the space *c b* into two parts at *d*; with the extent *c d* in the compasses set off *c f* and *c e*; connect *a f*, *f c*, and *e b*, and the square will be complete.

To lay off a square with a ten-foot rod:

Let *a b*, fig. I, be the given line; with eight feet of the rod from *b* make a mark at *a*; with six feet from *b* describe an arc at *c*; and with ten feet from *a* cross the arc at *c*; draw the line from the intersection at *c* to *b*, and it will be square with the line *a b*.

PLATE 2.



Three points (not in a right line) or a small part of a circle, being given to find a centre which will describe a circle to pass through the point or complete the circle:

Let *a b c*, fig. K, be the three points or part of a circle given; to find the centre of which, place the foot of the compasses in *a* and describe an arc at *d* and *e*; with the same extent place the foot of the compasses in *b*, and cross the arcs of *d* and *e*; and at the same time describe arcs at *c* and *f*; then with the same extent of the compasses and one foot in *c* cross the arc at *c* and *f*; draw lines through the intersections of the arcs at *d* and *e* to *g*; and through the intersections *c* and *f* to *g*; the intersections of these lines at *g* is the centre by which a circle may be drawn to pass through the points *a b c*.

To describe an Ellipsis mathematically to any given length and breadth:

Let A C, fig. A, Plate 2, be the transverse, and B D the conjugate diameters; take half of B D and set it in from C to o; divide what remains from o to 3 into three equal parts: set one of these parts from o to *a*; make the distance from 3 to *b* equal to the distance from 3 to *a*; with the extent *a b* in the compasses describe the arcs *d b c* and *d a e*; these four points are the centre by which the Ellipsis is drawn, and the dotted lines passing through them and touching the Ellipsis mark how much of it is drawn by each centre.

To describe an Ellipsis with a trammel:

A B C D, fig. B, represents the trammel, being two strips crossing each other at right angles and halved together. In the middle of these strips is a groove; *a d* is the tramel-rod, on which are blocks made movable like gauge-heads, with a pin to each small enough to slide along the groove; at *d* is a pencil; fix the block or pin *c* so far from *d* as to be equal to half the conjugate diameter, and the block or pin *b* so far from *d* as to be equal to half the transverse diameter; place the pins in the groove of the trammel, and on sliding them along the pencil at *d* they will describe an Ellipsis.

An Ellipsis being given, to find the centre and two axes thereof:

Let A B C D, fig. C, be the Ellipsis; draw a line at random, as *a b*; through another part of the Ellipsis draw *d e* parallel to *a b*; through the middle of each of these draw *e f*, on the middle of which is the centre of the Ellipsis; on which, with an extent of the compasses of less than half the transverse and more than half the conjugate diameters, describe the circle intersecting the Ellipsis in *g h i* and *k*; through the middle of *g h* and *i k* draw the line A C, which is the transverse diameter; bisect or divide this at right angles, and it will give the conjugate diameter.

To describe a regular Polygon of any number of sides, the length of one side being given:

Let *a b*, fig. D, be the side given; on one end, as *b*, with any convenient radius or extent of compasses describe a semicircle; divide the round of this into as many

parts as the Polygon is to have sides; leave out two of these parts, and with the length *a b* in the compasses set off from *b* to *c*, then from *c* to *d*, then *d* to *e*. When this is done, place the compasses on *a*, set off *a f*, then *f g*, connect *g* and *e*, and the Polygon is completed.

PLATE 3.

To describe an Octagon within a square, fig. 1:

Draw the diagonal *a b*, and with the extent *b d* draw the arc *c d e:* then will *e f* be the quantity to lay off from each corner of the square; or, if it is a piece of wood, to set the gauge for the quantity to be taken off from each corner.

To describe a segment of a circle of large radius with a trammel, fig. 2:

Let *a b* be the chord, and *d c* the height of the segment; lay a strip with a straight edge from *b* to *c*, and then another from *c* to *e* parallel to *a b;* fasten them together and brace them with a lath; fix pins in the points *a c* and *b*, and slide the frame or trammel along these pins, and the angle of it will describe the segment required.

To draw a segment of a circle by intersecting lines, fig. 3:

Let *a b* be the length or chord of the segment, and *c d* the height; draw the chord-line *d b*, at right angles to which draw *b e;* through *d* and parallel to *a b*, draw *f d e;* divide *f e* and *a b* into any even number of parts, say 10, connect those divisions by the line 1 1, 2 2, 3 3, &c.; draw *b b* perpendicular to *a b*, and divide it into 5 parts; from the centre *d* draw lines to these divisions, and where these lines cross the lines 1 1, 2 2, 3 3, &c., are the points through which to trace the segment.

To draw the arches of a groin, so that they shall intersect or mitre truly together over a straight line, from a given arch of any form, fig. 4:

A is the plan to be covered, B the arch of one side, which is here a semicircle; draw the chord-line *a b*, which divide into any number of parts; from the centre draw lines through those parts, touching the arch; draw *b c* perpendicular to the base-line, and from the crown of the arch at *a*, draw lines through the points of intersection of the former lines with the arch-line, to the perpendicular line *b c;* lay off the width of one of the other arches, as *b c* at C, being the width of one end of the plan A; set up the height of the middle of the arch the same as B; draw the two chord-lines *a b*, and *a c;* divide them into the same number of parts as *a b* in B; transfer the perpendicular line *b c* from B to C, draw lines from the middle of the base through the divisions on the chord-line, and from the top of the arch to the divisions on the perpendicular line, through the intersection of these lines, the arch-

PLATE 3.

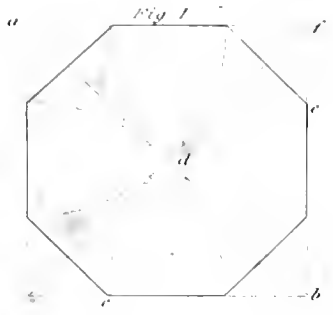


Fig. 1
a
f
e
d
c
b

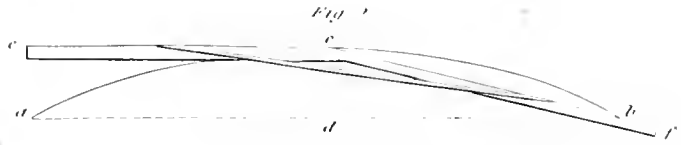


Fig. 2
c
e
a
b
f
d

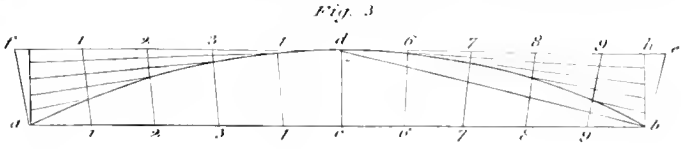
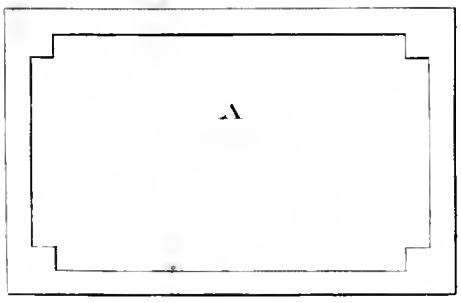


Fig. 3
f
1
2
3
4
d
6
7
8
9
h
e
a
b


A

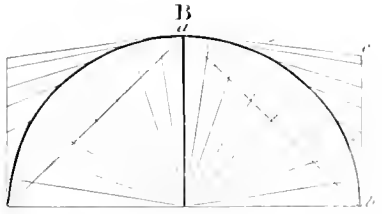
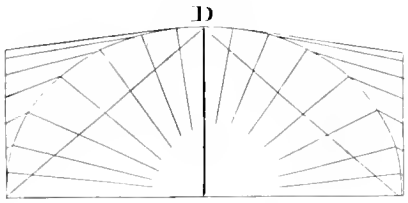
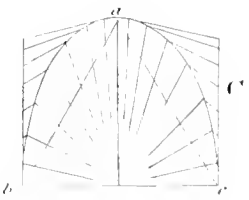

B
a
c
b

Fig. 1


D


a
C
b
c

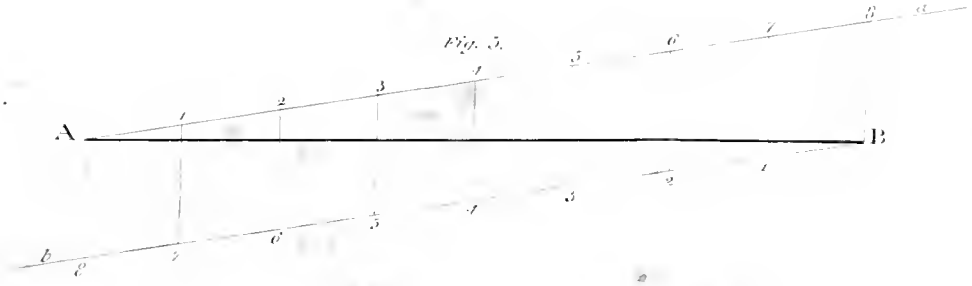


Fig. 5.
A
B
1
2
3
4
5
6
7
8
9
a
b
c
d
e

PLATE I.

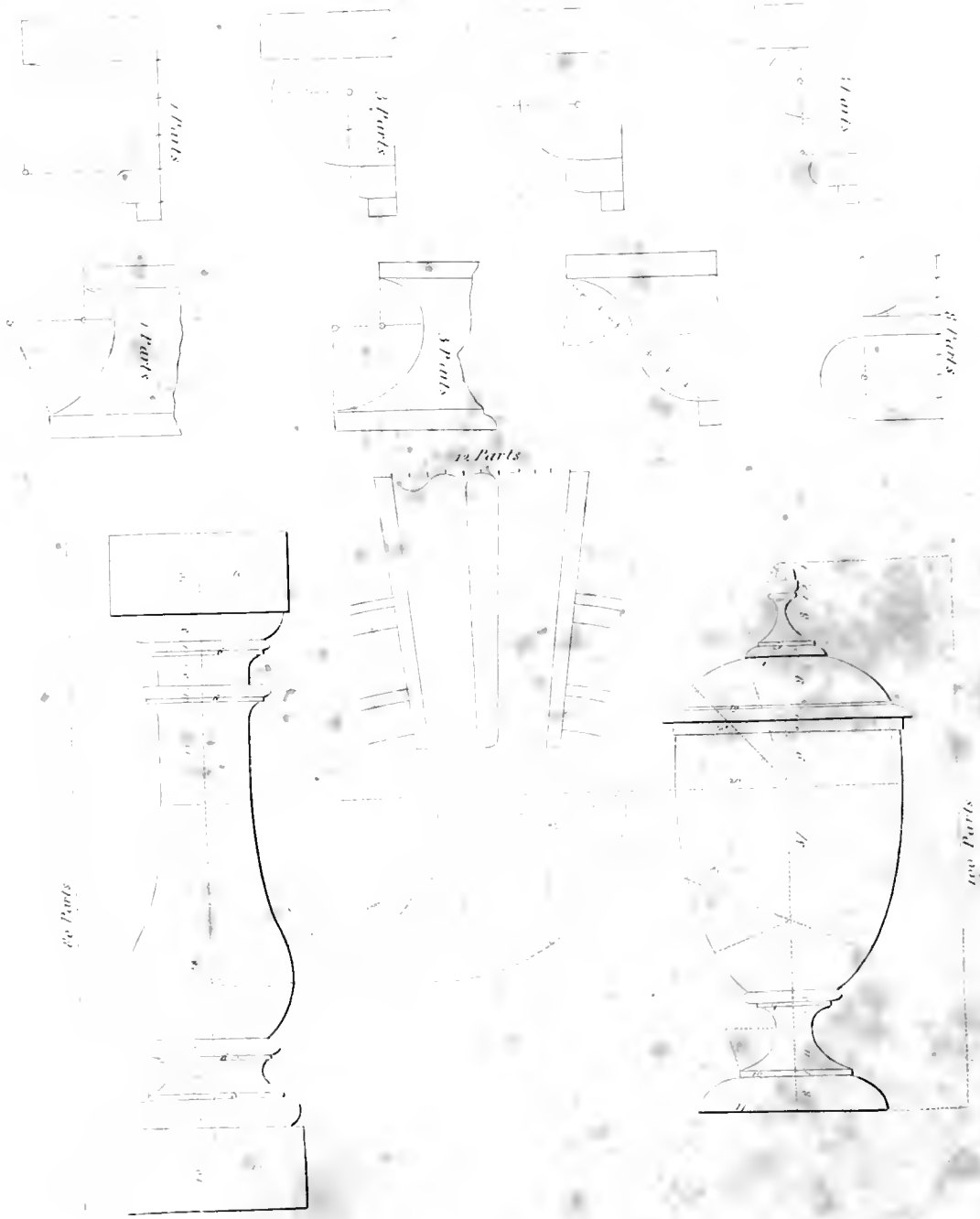
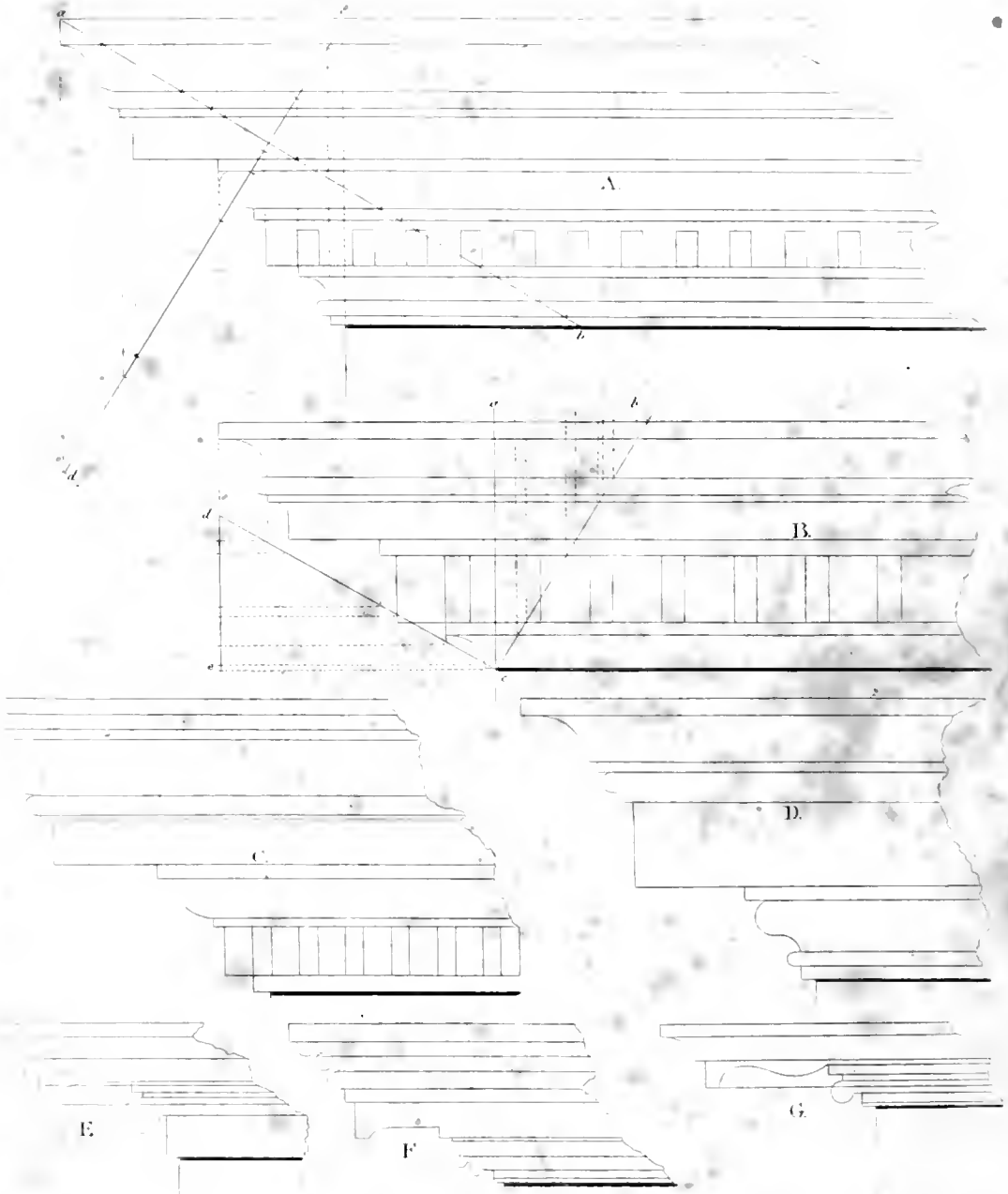


PLATE 5.



line required may be traced: D is the form of the groin or diagonal bracket traced in the same manner. This method may be applied to arches of any form, whether Elliptical, Circular, or Gothic.

To divide a right line into any number of equal parts, fig. 5:

Let A B be the right line given, to be divided into eight parts; from one end of it, as at A, drawing a line making an acute angle, as the line A *a*; from the other end of the line, at B, draw another line parallel to A *a*, as B *b*; set off on these two lines, beginning at A and B, the number of divisions required, without regard to their turning out to the length of the line, as 1, 2, 3, 4, &c. connect these by the lines 1 7, 2 6, &c. and where these lines cross the line A B is the point of division required.

PLATE 4

REPRESENTS A FEW

MOULDINGS,

The centres for drawing which, being all represented, are perhaps sufficiently clear.

The Consol, or Key, should be in height equal to twice its width at bottom.

The Vase and Baluster are to show the manner of drawing compound circular lines; the meeting of the dotted lines showing the centre. The Student will observe, that when it is required to draw two or more circular lines of different radii, which are to appear smooth round, the two centres, and the place of meeting of the different circles, should always be in a right line.

PLATE 5.

Fig. A shows the method of enlarging a draught of a cornice.

Let the line *a b* be the height to which it is required to enlarge the cornice. Wherever this line crosses the different members of the draught, mark it, and these marks will give the height of the different members of the enlarged cornice.

To find the projection, enlarged in proportion:

From the point *c*, directly over the front of the wall, draw the line *c d* at right angles or square with the line *a b*, on this line square over the projection of the different members of the draught, and that will give the projection required.

Fig. B is the method of contracting a draught.

Let *a b* be equal to the height of the cornice required; from *b* draw the line *b c*, and, where that crosses the different members of the draught, draw lines perpendicular to cross *a b*, which will be the height proportioned.

To find the projection, contracted in proportion:

From *c* draw the line *c a* at right angles or square with *b c*, then draw down the projection of the draught on this line, and from this line carry them square out to the line *d c*, which will be the projection contracted in proportion to *a b*.

These two cornices, with figures C and D, may serve as examples for the Student to apply to frontispieces, &c.; and the other three, E, F, and G, are examples of Stucco cornice in the present fashion; of which G may serve where the story is low, and but little room over the window.

PLATE 6.

Fig. A shows the manner of finding the form of a raking cornice, which will mitre with a level one; and the return at top for an open pediment.

Let *a* be the level cornice; from the face of this, nearly at equal distances apart on the face, draw lines parallel to the rake; then draw the level lines 1 1, 2 2, &c. from the face of the cornice *a* to the perpendicular line *d c;* draw *f g* at *b* square with the rake, and make 1 1, 2 2, &c. at *b* equal to 1 1, 2 2, &c. at *a;* and trace the cornice through the points 1, 2, 3, 4, &c; which will be the form of the cornice required. The return at top is set off in the same manner from the perpendicular line *h i*, excepting that the projections at *a* are taken on the raking line.

Fig. B is the method of finding the sweep of a cornice, which will bend round a circular wall and stand on a spring.

Let *a* be a plan of the wall, *d* the centre of it, and *b* the cornice drawn to its proper spring. Draw the line *c c* touching the face of the cornice, and continued till it intersects a line drawn perpendicular from the centre *d;* the intersection at *c* will be the centre from which to draw the cornice.

Fig. C is the method of drawing a cornice, to bend round the inside of a room; which, being done by the same rule as the former, needs no further explanation.

PLATE 6.

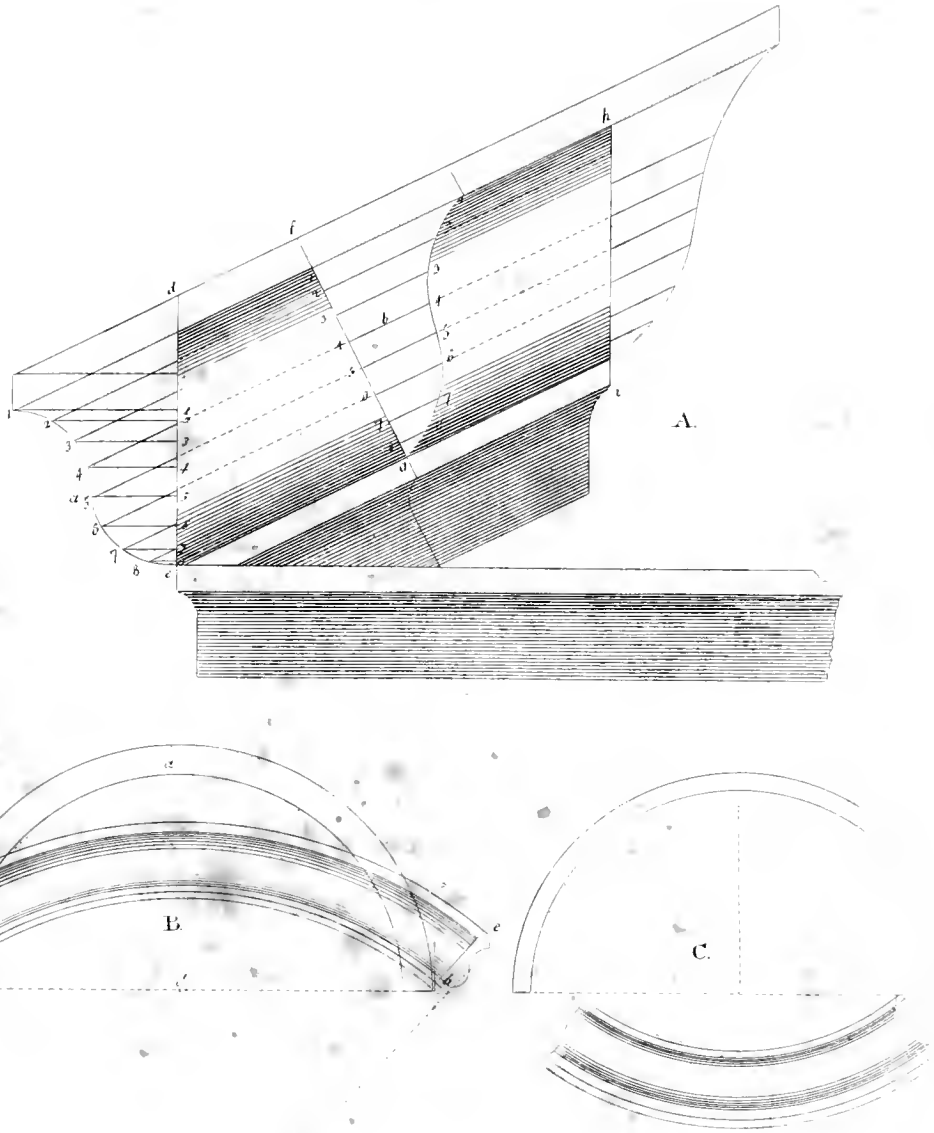
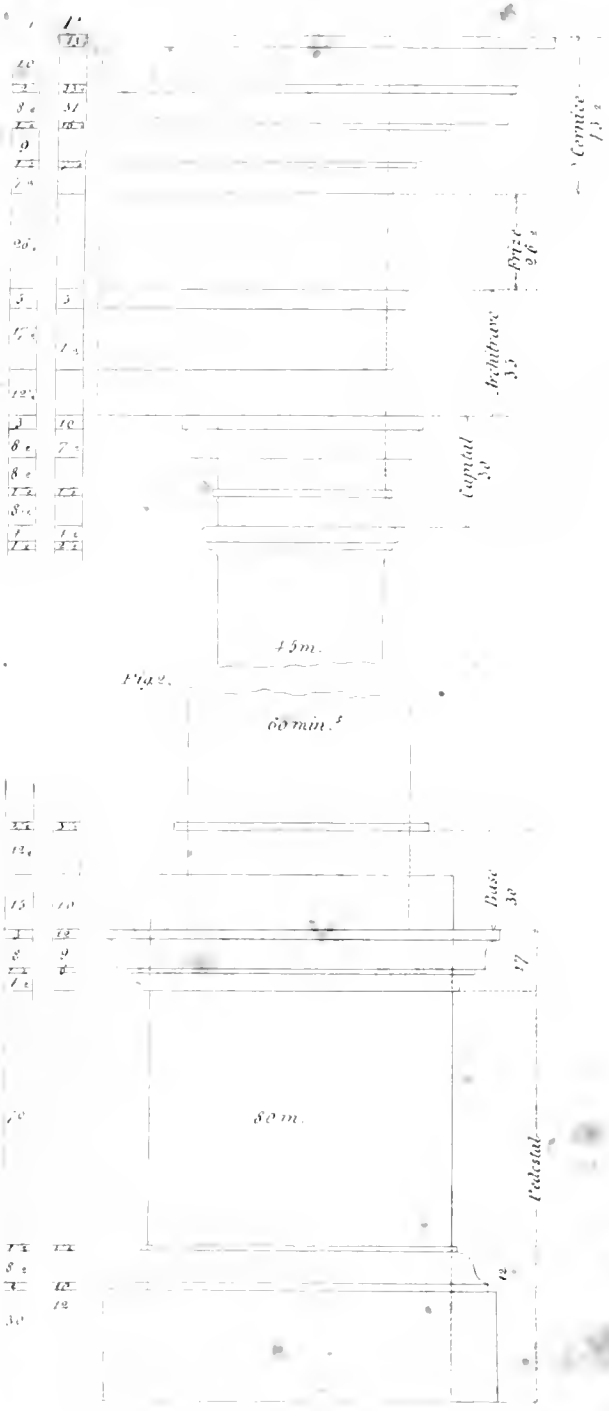


PLATE 7.


Cornice
Frize
Architrave
Entablature
Capital
45m.
Fig 2.
60 min.s
Base
Pedestal
80 m.

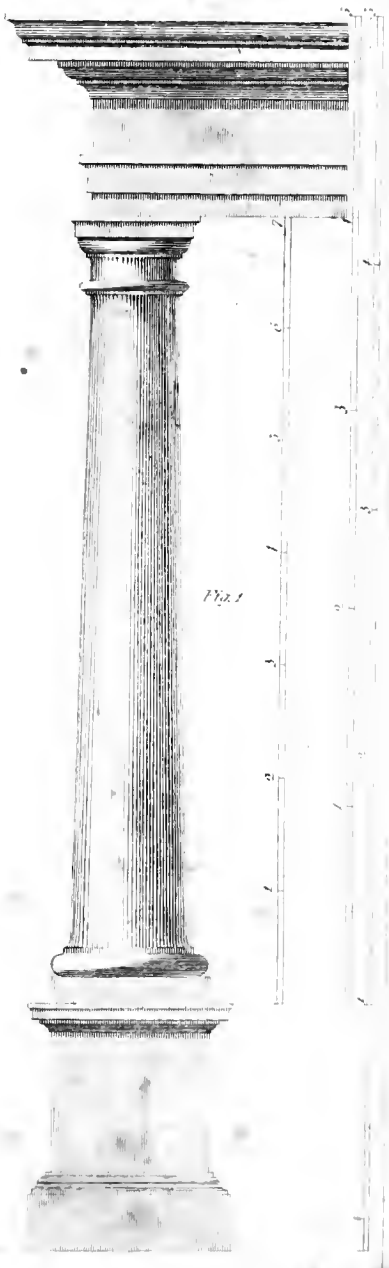
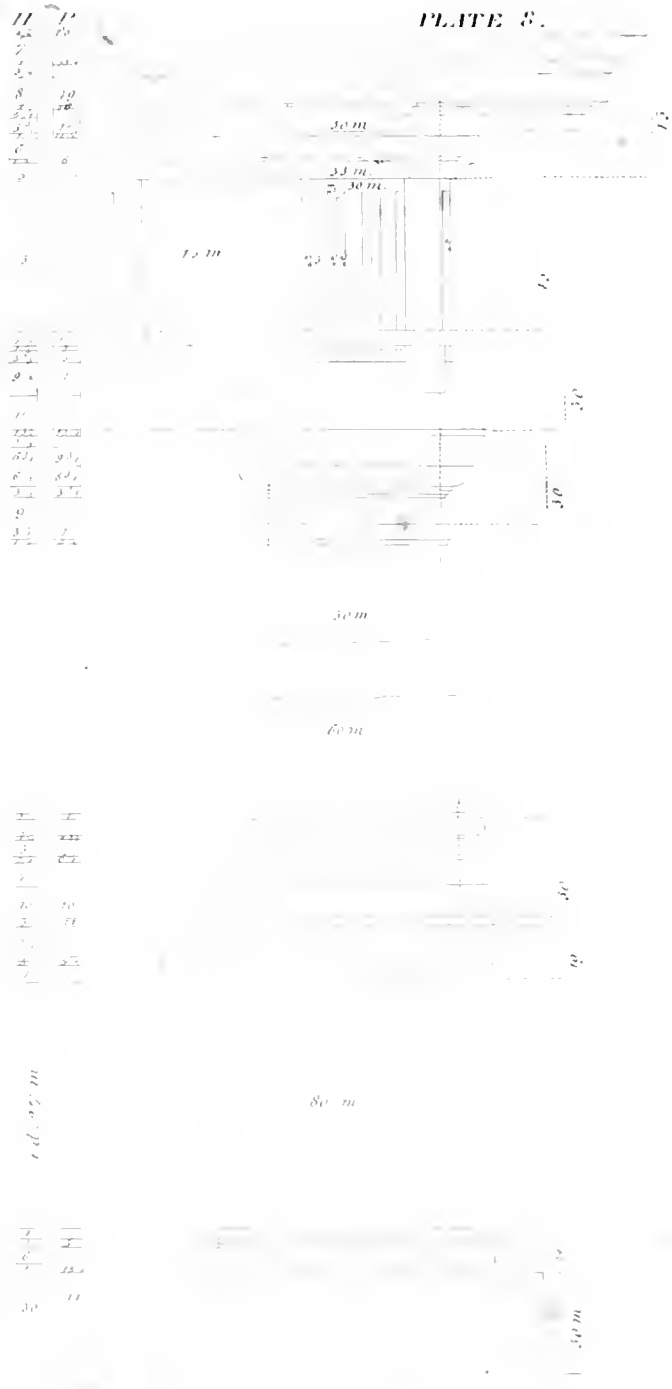
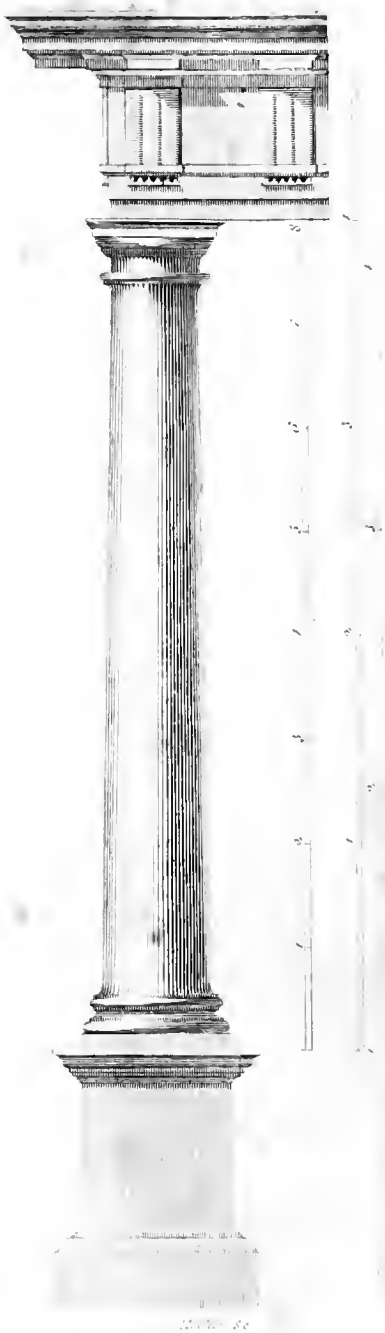


Fig 1
Hooker Sc.

PLATE 8.





TO PROPORTION THE FOUR ORDERS OF ARCHITECTURE.

THE TUSCAN ORDER.*

PLATE 7.

When this Order is to stand on a Pedestal, the whole height must be divided into five parts, one of which is the Pedestal, one-fifth of the remainder is the Entablature, the other four-fifths are the length of the Column, including the Base and Capital: This divided into seven parts, one of them is the diameter of the Column just above its base; this diameter, being divided into sixty parts or minutes, is the scale by which all the mouldings are proportioned, both in height and projection. A reference to fig. 1 will explain the proportions. Fig. 2 shows the proportion of the mouldings; the heights, by the scale of 60 minutes, being set down on the outside list, marked at top with the letter H, and the projections measuring from the perpendicular line of the shaft of the Column, and the front of the Pedestal, in the other list marked P. The Column in this Order is diminished to 45 minutes at its upper end.

THE DORIC ORDER.†

PLATE 8.

The general proportions of this Order are the same as the Tuscan, excepting that the diameter of the Column is one-eighth of its length. The Column in this Order is diminished at its upper end to 50 minutes; the width of the triglyphs in the frize is 30 minutes; the distance from the middle of one triglyph to the middle of the next, 75 minutes; this should be attended to in using this Order and those that follow, in Porticos, Colonnades, &c.; as a triglyph or modillion must always stand exactly over the middle of the Column. The distance between the centres of modillions in this

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* Of the Tuscan there are no examples of Antiquity remaining, excepting the Trajan and Antonine Columns at Rome, which are generally reckoned of this Order, being nearer in their proportions and mouldings to it, than to any other. It is supposed to receive its name from Tuscany, being more used there than elsewhere.

† Doric, so called from Dorus, who, according to Vitruvius, built a Temple dedicated to Juno in the City of Argos, wherein the proportions of this Order were used, and which were afterwards adopted by the Cities of Achaia.

The ornaments of this Order clearly evince it to have been the first invented of all the Orders of Architecture. In many instances the Columns were very short in proportion to their thickness, and without bases; and between the triglyphs there is generally placed a bull's skull. The Architrave is sometimes made much wider than here represented, with only one facia; but I have preferred these proportions, as handsomer.

Order is so great, that the Columns cannot be coupled, as they frequently are in other Orders; the flutes of the triglyphs are 5 minutes wide each, and sunk 2 and a half minutes. The plancers and underside of the modillion are represented in Plate 13, and the method of drawing the scotia of the base is shown in Plate 10.

THE IONIC ORDER.*

PLATE 9.

One-fifth of the whole height of this Order is given to the Pedestal; one-sixth of the remainder is the Entablature; and, the Column being divided into 9 parts, one of them is the diameter. The Column in this Order is diminished to 50 minutes at its upper end; the distance from centre to centre of the modillions is 31 minutes.

PLATE 10.

To draw the Volute.

Divide the whole height of the volute, as in fig. 1, into 8 parts; in the fourth of these from the bottom draw a circle equal to one of those parts, within which make the square *a b c d*, which, for a clearer explanation, is transferred to fig. 2, on a larger scale, in the same position that the small one is in the volute; divide the square into 4 parts by the line 1 3 and 2 4; divide each of these lines into 6 parts, and number them as is there represented. To draw the volute, place one foot of the compasses on 1 in the eye of the volute, extend the other to 1 on the top of the volute, and draw round to 2 on the edge of the volute; then place the one foot on 2 in the square or eye, and draw the other round to 3, and so on taking each centre in numerical order till it is all drawn. To find the centre for the inside of the list, set in from each centre one-fourth of the distance from that to the next one, as is represented in fig. 2; for the width of the list at top take one-sixteenth of the whole height, being 1 and a half minutes; to draw that part of the volute from 1 to o, set the compasses at the bottom of the square.

Fig. 3 explains the manner of drawing the scotia of the Attic Base. Divide the height of the scotia into 3 parts, at the distance of one of these parts from the top draw the line *a b c*, on which *b* and *c* are the centres for drawing the scotia, and the line *a b c* is the limit of each quarter.

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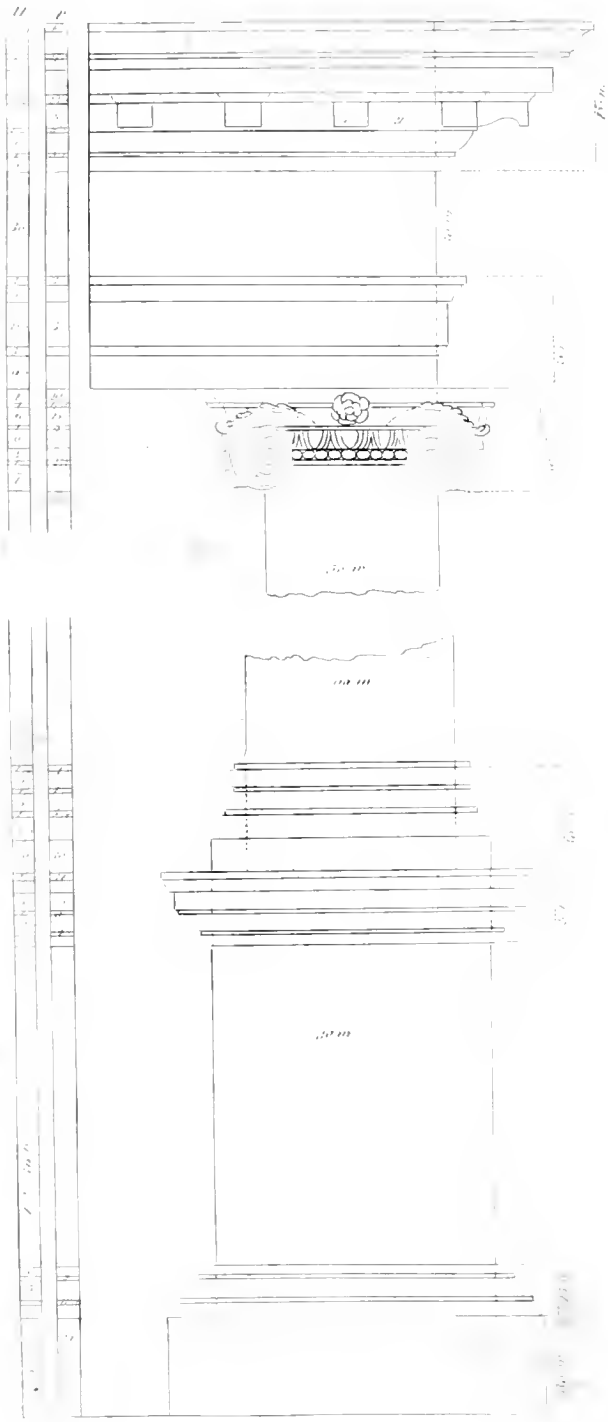
* Ionic, from Ion, the Son of Xuthus, who, building a Temple to Diana, invented this Order. The Ancients generally made their Capitals in this Order flat, and to face only one way; but, the angular Capital being thought by many more convenient, I have here given that.

PLATE 9.



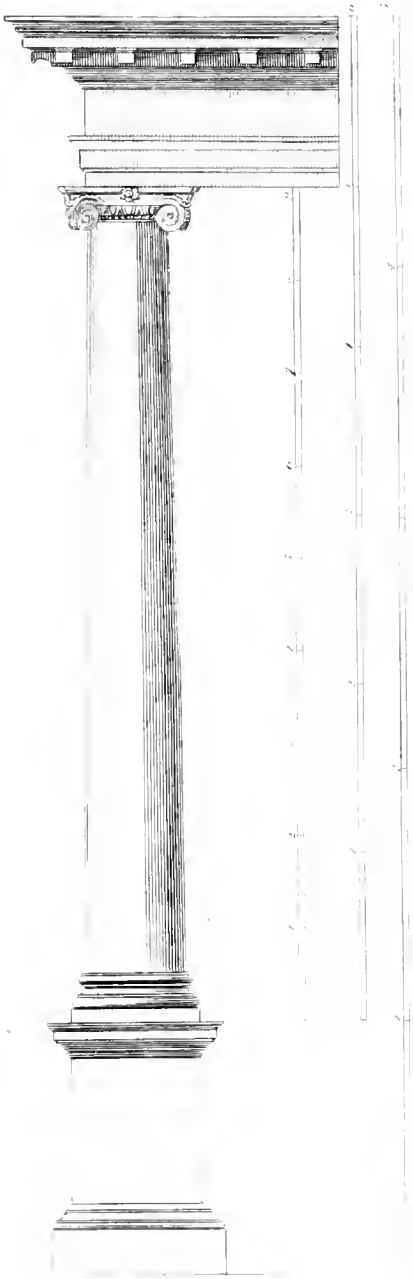
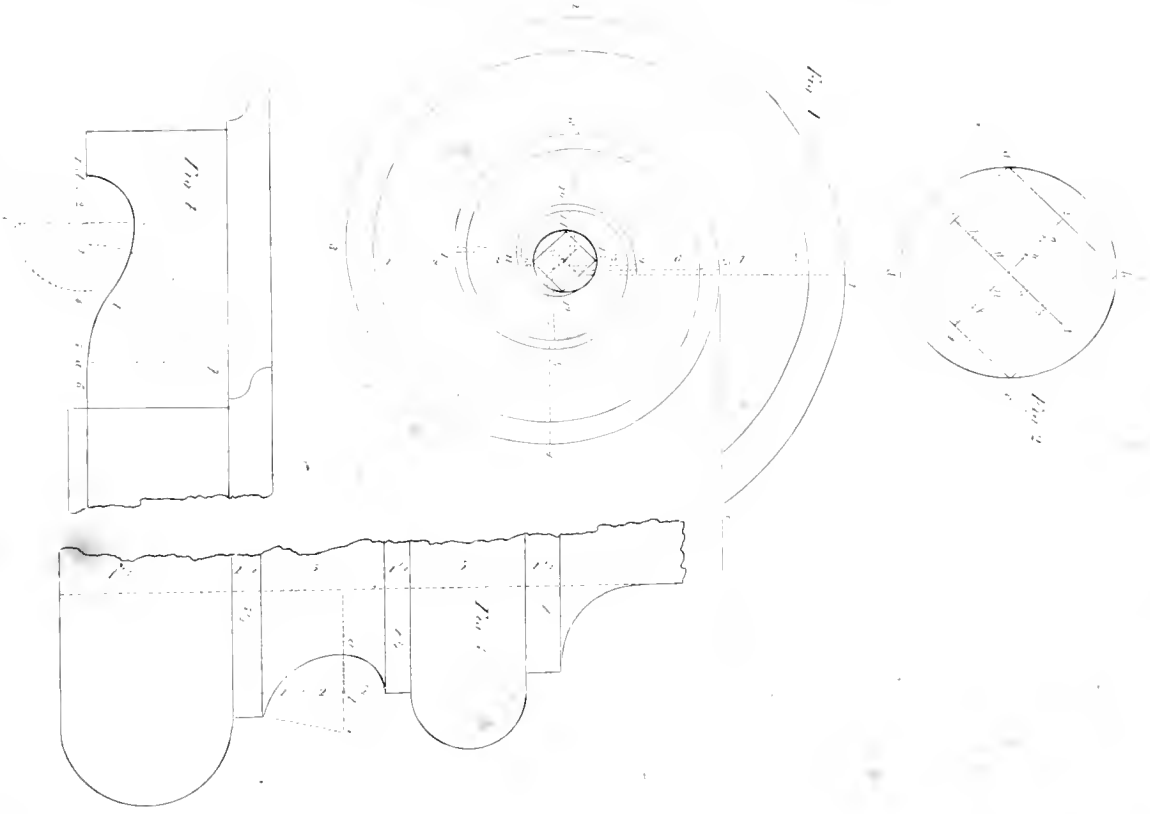
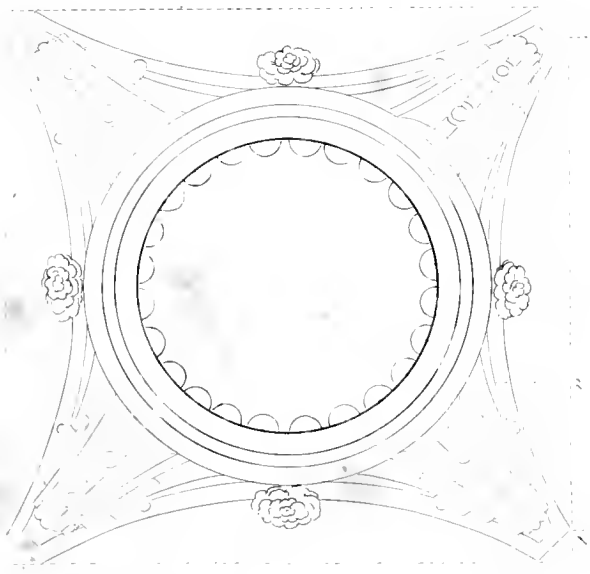


PLATE 10.





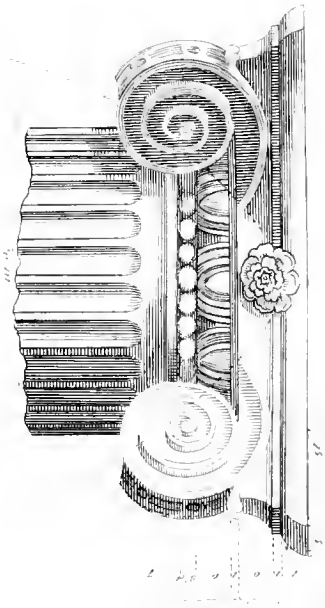


PLATE II.

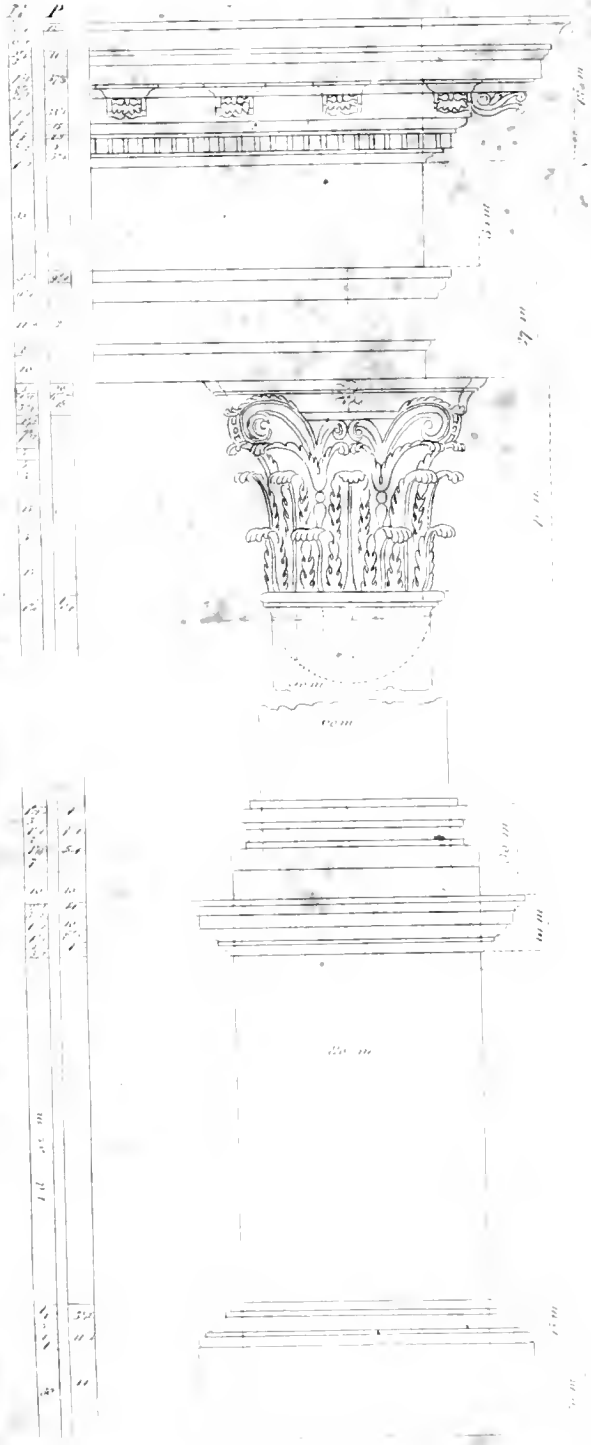
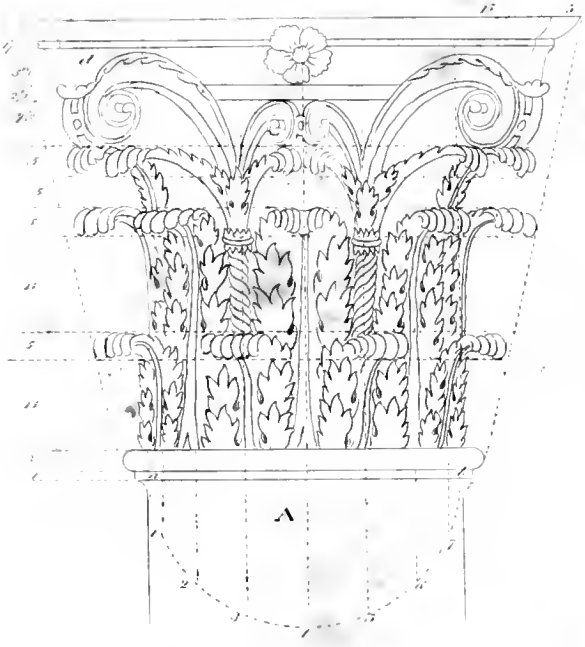
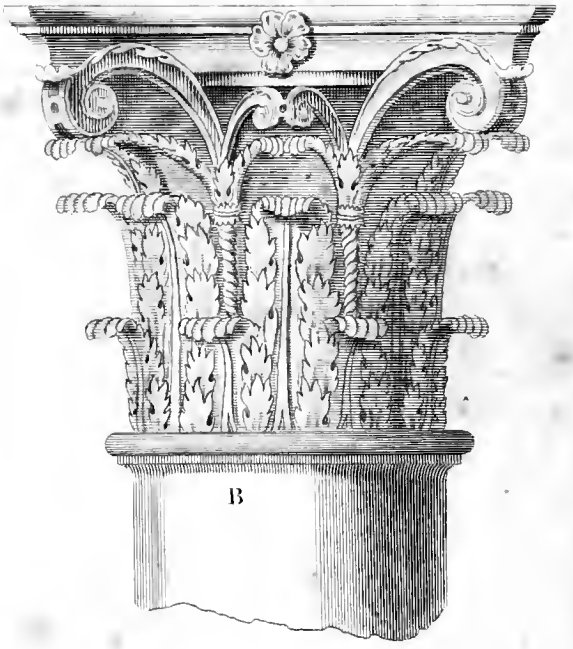


PLATE 12

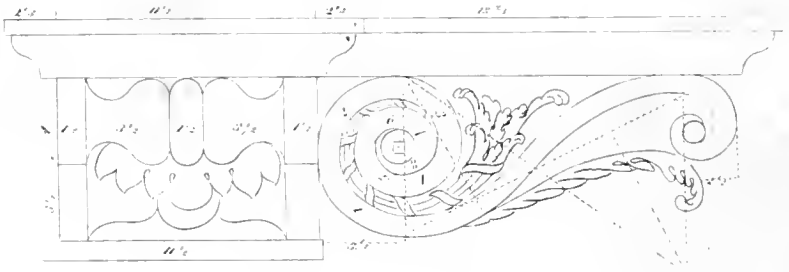


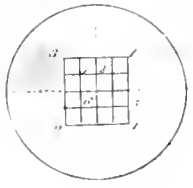
A



B

C





D

Fig. 4 is the Ionic Modillion; to draw which divide the bottom or projection into six parts, as 1, 2, 3, &c. two and a half of these divisions up over *a* is the centre of from *a* to *b*; under 2 one and a half divisions down, is the centre of from *b* to *c*; and at two is the centre of from *c* to *d*; the line *e f* from one centre to the other marks the limits of each arc. Here I will take the liberty of remarking, that when circles of different radii unite, and are required to appear smooth round, the two centres and place of meeting should always be on one line, as may appear in the two last examples.

Fig. 5 is the Ionic Capital on an enlarged scale, with a plan by which a clearer idea may be had of angular volutes.

THE CORINTHIAN ORDER.*

PLATE 11.

The general proportions of this Order are, one-fifth of the entire height for the Pedestal, one-sixth of the remainder for the Entablature, and one-tenth of the height of the Column is the diameter. The column diminishes to 50 minutes at its neck; the Modillions are 11 and a half minutes wide, and 35 minutes from centre to centre of each; the dentils are 3 and a half minutes wide, and the space between each two-thirds of a dentil. For an enlarged Capital and Modillion, see next Plate.

PLATE 12.

Fig. A is the Corinthian Capital; the height being figured from the scale of minutes is plain to inspection. To find the place for each leaf, draw a semicircle, as *a* 4 *b*, equal to the diameter of the neck of the Column; divide the round of this into 8 parts, and from each of these draw lines through the Capital; these lines mark the place of each stock, or middle of each leaf. It may not be improper to remark, that the inner break in the abacus or upper moulding of the Capital should not have as much projection as the outer one, as at *d*. If the real appearance of the

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* The following origin of the Corinthian Order is given by Vitruvius:

'A marriageable young lady of Corinth fell ill and died. After the interment, her nurse collected together sundry ornaments with which she used to be pleased; and putting them into a basket, placed it near her tomb; and, lest it should be injured by the weather, she covered it with a tile. It happened the basket was placed on the root of an Acanthus, which in the spring shot forth its leaves; these running up the sides of the basket, naturally formed a kind of Volute, in the turn given by the tile to the leaves. Happily Calimachus, a most ingenious Sculptor, passing that way, was struck with the beauty, elegance, and novelty of the basket surrounded by the Acanthus leaves; and, according to this idea or example, he afterwards made Columns for the Corinthians, ordaining the proportions such as constitute the Corinthian Order.'

[*Rudiments of Ancient Architecture.*]

moulding at *d* were given, it would be very near a straight perpendicular line; but, as that would not look well, a little liberty is taken to improve the appearance.

Fig. B is the same subject shaded, for the assistance of Students.

Fig. C is the Corinthian Modillion, the parts being figured from the scale of minutes; fig. D is the eye of the Modillion on an enlarged scale; the centres are numbered, each centre serving for one-quarter of a circle, and these quarters are numbered in the Modillion.

PLATE 13.

In this Plate is represented the Planeers of the Corinthian, Ionic, and Doric Orders, at an external angle. The student may observe the Modillions in all cases correspond with the Column; and in the Doric Order they are enriched with drops, the shape of which is represented by the drops of the triglyphs.

PLATE 14.

Of diminishing Columns.

Columns are sometimes diminished from the bottom, and sometimes the diminishing commences at one-third of the height from the base.

Fig. A represents a Column with the lower third-part undiminished.

Divide the upper two-thirds into any number of equal parts, say 5, as at 1 2 3 4 5; *a b* at top is equal to the full thickness below; set in on each side from *a* and *b* half the difference between the size of the Column at top and that at bottom, as *a c* and *b d*; divide each of these into the same number of parts that the upper two-thirds of the Column is; draw lines from *c* and *f* to each of those parts, and where these lines cross the divisions, 1 2 3 and 4, will be the points through which to draw the edge of the Column.

When Columns are made of plank glued up, the planks must each be diminished before gluing, in the same manner as if they were each a complete Column.

Fig. B is a representation of a Column fluted.

Draw a semicircle on each end of the Column; divide the round of this into 12 parts, and each of these again into 8 parts; 6 of these go to a flute, and 2 to a fillet. Observe, that a flute will always be exactly in the middle of the Column.

Fig. C is a fluted Column, shaded, to show the effect.

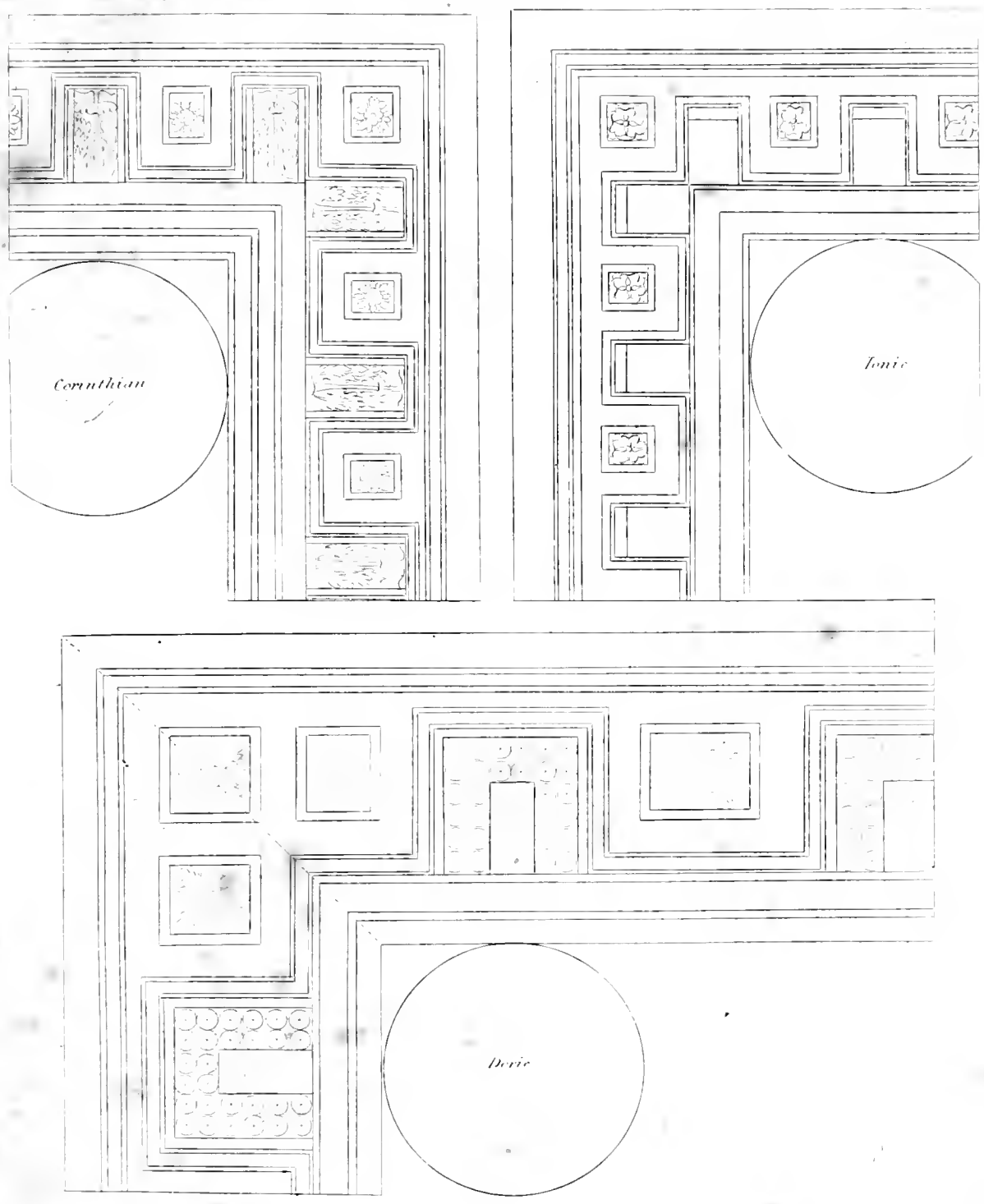
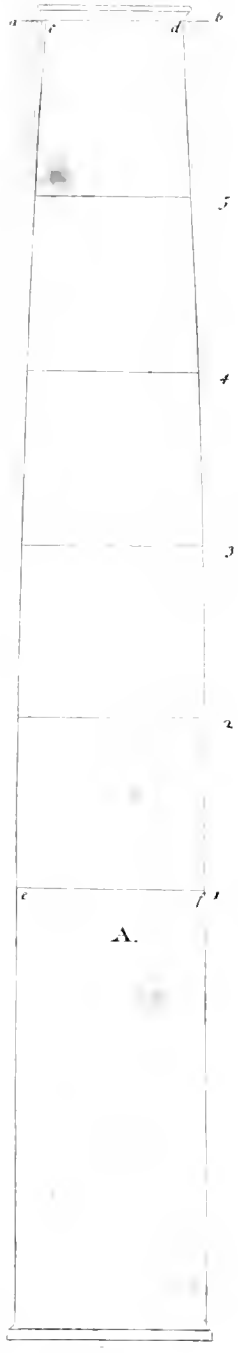
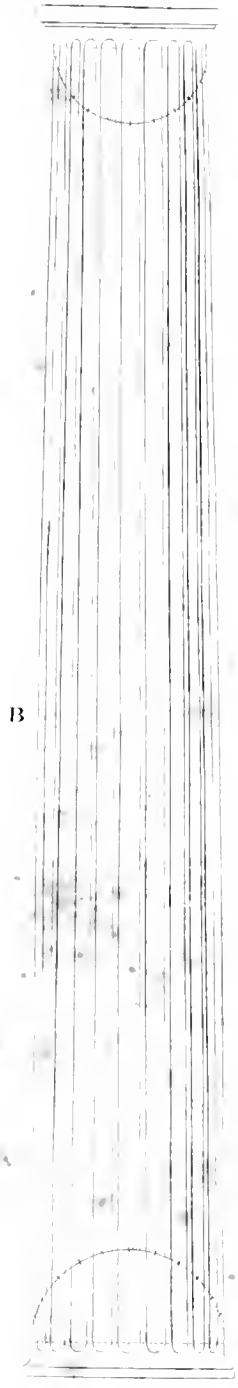

Corinthian
Ionic
Doric

PLATE II.



A.



B

C.

DOOR.

Door (from the Saxon *dor*), the gate of a house, or the passage into an edifice, apartment, &c.

The construction of doors naturally divides itself into two branches, *viz.* the formation and proportion of the aperture, or opening, which in outer walls belong to the mason or bricklayer, and forming of the gate or leaf, by which the entrance is to be secured, together with its appurtenances, which appertain to the Carpenter's department.

The proportion of the aperture must always be according to the size and intention of the building, and should be attended to above every other consideration: in general, the dimensions may be in the ratio of one to two for large doors, and from three to seven in those of less size.

Entrances are of two kinds; doors and gates.

The former are used only for the passage of persons on foot; the latter admit horsemen and carriages. Doors are used for churches, public edifices, dwelling-houses, and apartments; gates serve as inlets to cities, fortresses, parks, gardens, &c. Apertures of gates, being always wide, are usually arched; while the figure of doors is generally a parallelogram.

Public buildings, palaces, and noblemen's mansions, where a great concourse of company may be expected, should have doors of much greater dimensions than those of other buildings; from six to twelve feet may be taken for the width of the outer entrance, and from four to six feet for those in the interior: in private houses, the latter, if they have but one leaf, should never be more than three feet and a half in breadth, nor less than that of the windows. In all cases their height should be proportioned to that of the story in which they are placed, except where they are used for laying two apartments into one; in which case they will be of a height less than double their width.

Vitruvius, in his fourth book, has prescribed rules for Attic, Ionic, and Doric doors, all of which have their apertures wider at the bottom than at the top; examples of this shape may be seen in the ruins of the temple of Minerva Polias at Athens, and the temple of Vesta at Tivoli, and in other Greek and Roman remains. These doors possess the advantage of shutting themselves, to which they probably owe their invention; and they may be conveniently adopted in modern houses, as they rise in opening and will clear a carpet, though, when shut, they go close down upon the floor.

The principal entrance to a building of any magnitude should be in the centre, as productive of the greater symmetry of appearance, and as communicating more readily with the various apartments of the interior. In the principal rooms, the door should be two feet, at least, from the return of the wall, to admit of furniture being placed close up in the corner.

The lintels of exterior doors should always range with those of the windows. Apertures placed in blank arcades, are usually placed at the same height as the springing of the arches: when they have dressings, the head of the architrave, or cornice, is generally on the level of the impost.

The decorations of a doorway commonly consist either of an architrave surrounding it, with or without a cornice, or with a complete entablature; consoles are sometimes introduced, flanking the architrave jambs, and supporting the ends of the cornice. When the architrave jambs are flanked with pilasters, whether of the orders, or of some emblematical form, the projections of their bases and capitals are always less than those of the surrounding architrave, and the architrave over the capitals is similar to that over the door itself. Doors are sometimes decorated with one of the five orders, and, in very considerable buildings, the entrance is adorned with a Portico, so as to resemble an ancient Grecian temple. In embellishing the piers of gates, or outer doors, it should be remembered, as a general rule, that as the pier is itself only an inferior building, it should never be richer than the front of the house. As, where the front of the latter is ornamented with Doric columns, the Ionic should not be found in the piers; and it would be better to omit columns altogether, than use the Tuscan order for piers in any case. If the Ionic or Corinthian orders be used in the front of the house, the Doric or Ionic may be with propriety introduced in the piers. Niches are almost always introduced into piers, for which reason the columns do better on pedestals, because the continued mortising from their cap forms an agreeable ornament under the niche.

The wooden closure by which the apertures are opened or closed, come within the province of the Carpenter; these are properly the doors, and are either framed, battened, or ledged, as hereafter described. In ordinary and even in good houses, frequently the doors are of pine; in first-rate mansions they are often of mahogany, solid or veneered, and sometimes of wainscot, especially where the building is of the antique style. Apartments reserved for the reception of money, plate, jewels, &c. are usually secured with iron doors; and in the descriptions of ancient temples, we read of doors of ivory, brass, silver, and gold.

Batten doors, though formerly much in use, are now confined to buildings in the pointed style of architecture. They consist of boards glued together to the size of the aperture, with styles, rails, and munnions, made of battens nailed upon them, so as to give the appearance of a frame door. This may be done, either on the one or both sides; and the door is accordingly denominated single or double battened. The vertical joints should be hid by the munnions of the framing, and the latter, instead of being glued, should be bolted through to a framing behind, which will make them very strong. The large gates and doors of ancient British edifices are thus constructed. The practice of imitating the framing of Grecian and Roman doors, is not, however, to be recommended in modern times, especially if no bolts be used; for the stuff, though never so well seasoned, will be subject to the influence of the atmosphere, and shrink or swell as the air is dry or damp. It is scarcely necessary to remark that this evil will be enhanced in proportion as the wood is less seasoned. Framed doors, which are either single, folding, double, or double margin, are employed in all description of building, and consist of styles, rails, panels, and in most cases, of munnions also. The framing includes all parts but the panels, and is held together with mortises and tenons. The styles are the vertical parts of the framing at the sides. The rails are the horizontal pieces into the styles. Munnions are parts of the framing tenoned into rails. The panels fill up the whole left in putting the framing together; and are let into grooves cut in the internal edges of the styles, rails, and munnions. Doors are generally framed into rectangular compartments:

though other forms, as circles, ellipses, lozenges, &c. may be adopted, according to the will of the proprietor, or taste of the builder. Framed doors are either square or moulded; the former are used only in common houses. Mouldings are of various forms, some confined within the framing, and others projecting beyond it. The mouldings and form of the panels of the door, generally regulate those of the window-shutters. *Folding doors*, or *doors of communication*, are made in two breadths and have a pair of styles to each leaf.

Double-doors are contrived to close against each other in opposite directions, the one opening outwards, and the other going inwards, in order to keep the apartments warm: the inner door being generally covered with green baize.

Double-margin doors, are single doors, with a broad piece running vertically down the middle, called the *staff-style*, imitating the two internal styles of folding doors when shut.

Whatever kind of door be adopted, it should, for the sake of uniformity, be used in all the apartments of the same story.

Architrave of a door, a collection of members surrounding the aperture of a section similar to the architrave of the Ionic, Corinthian, and Roman Orders. The head or lintel is called the traverse, and the sides the jambs. Vitruvius calls the jambs the *antepagmenta*, and the head or traverse the *supercilium*. In the remains of the edifices at Balbec and Palmyra, and in the palace of Diocletian at Spalatro, the architrave jambs are often flanked with consoles, which gives an apparent support to the cornice, and the cornice frequently rests upon the traverse, without the intervention of frieze; but the flank pilaster under the consoles is scarcely to be met with among the ancient ruins, though practised by the modern Italians, and represented in their works. This is however an improvement, as it diminishes the apparent weight of the top, by spreading out the lower part. The proportion of the architrave to the aperture, in ancient edifices, is very various: the usual proportion given by the moderns, is from one-seventh to one-sixth part of the opening. When the architrave jambs are flanked with pilasters and consoles, the breadth may be one-seventh of that aperture, and the breadth of the pilaster two thirds of that of the architrave; but when it is unaccompanied with these ornaments, it ought not to be less than the sixth part of the aperture.

In the ruins of Roman and Grecian buildings, the architrave rests upon the floor, and has no flanking consoles: but in the ruins of Balbec they are supported by plinths.

When there is too much surface of naked wall on each side of the architrave jambs, the sides of the architrave may be flanked with pilasters, and consoles, in order to reduce the naked, and proportion it to the dressing of the front. The dressing of an aperture may be heightened by adding a cornice, or a cornice and frieze, as the space above will admit: and if the space above requires further diminution, the altitude of the dressing may be still further increased, by surmounting the cornice with a pediment.

When the material of the architrave is stone, the jambs are either built in heights corresponding to the course of the naked of the wall, or if stone can be procured each jamb is made of one entire piece, or sometimes in two or three, according to the difficulty of raising them from the quarry.

When they are coursed with the work, every alternate stone should be a bond-

stone, and, if the jambs are in one height, or not coursed, every alternate stone in the altitude of the naked, adjoining each architrave jamb, should be a bond-stone: the fewer pieces the architrave jamb consists of, the more beautiful will the work appear; therefore one is preferable to several.

In the arcades of ancient buildings, the jambs are seldom or never moulded as an architrave, but the arch is frequently ornamented with members of an architrave section: these members are called the archivolt, which always rests upon imposts. The imposts project in most cases from the naked of the wall, and in a few cases from the capital of pilasters upon the jambs.

Architrave in Carpentry, is one constructed of wood. Architraves may be worked out of a solid piece of wood; but this, however, would be attended with a waste of both stuff and time. The best method is to glue it up in two or more longitudinal pieces, as may be judged proper for the combination of its parts.

Jib-doors are used to preserve the uniformity of a room, or to save the expense of a corresponding door.

Doors ought to be made of clear good stuff, firmly put together, the mitres or scribings brought together with the greatest exactness, and the whole of their surfaces perfectly smooth, particularly those made for the best apartments of good houses. In order to effect this, the whole of the work ought to be set out and tried up with particular care; saws and other tools should be in good order; the mortising, tenoning, plowing, and sticking of the mouldings, ought to be correctly to the gauge lines; these being strictly attended to, the work will of necessity, when put together, close with certainty; but if otherwise, the workman must expect a great deal of trouble in paring the different parts before the work can be made to appear in any degree passable: this will also occasion a want of firmness in the work, particularly if the tenons and mortises are obliged to be pared.

In bead and flush doors, the best way is to mitre the work square, afterwards put in the panels, and smooth the whole off together, then marking the panels at the parts of the priming, they agree to take the door to pieces, and work the beads on the styles, rails, and mountings. If the doors are double margin, that is representing a pair of folding doors, the staff style, which imitates the meeting-styles, must be entered to the top and bottom rails of the door, by forking the ends into notches cut in the top and bottom rails. We shall here make a few observations upon, and give some rules for, hanging of doors, so as to clear the ground or carpet.

First. Raise the floor under the door as much as may be necessary, according to the thickness of the carpet, &c.

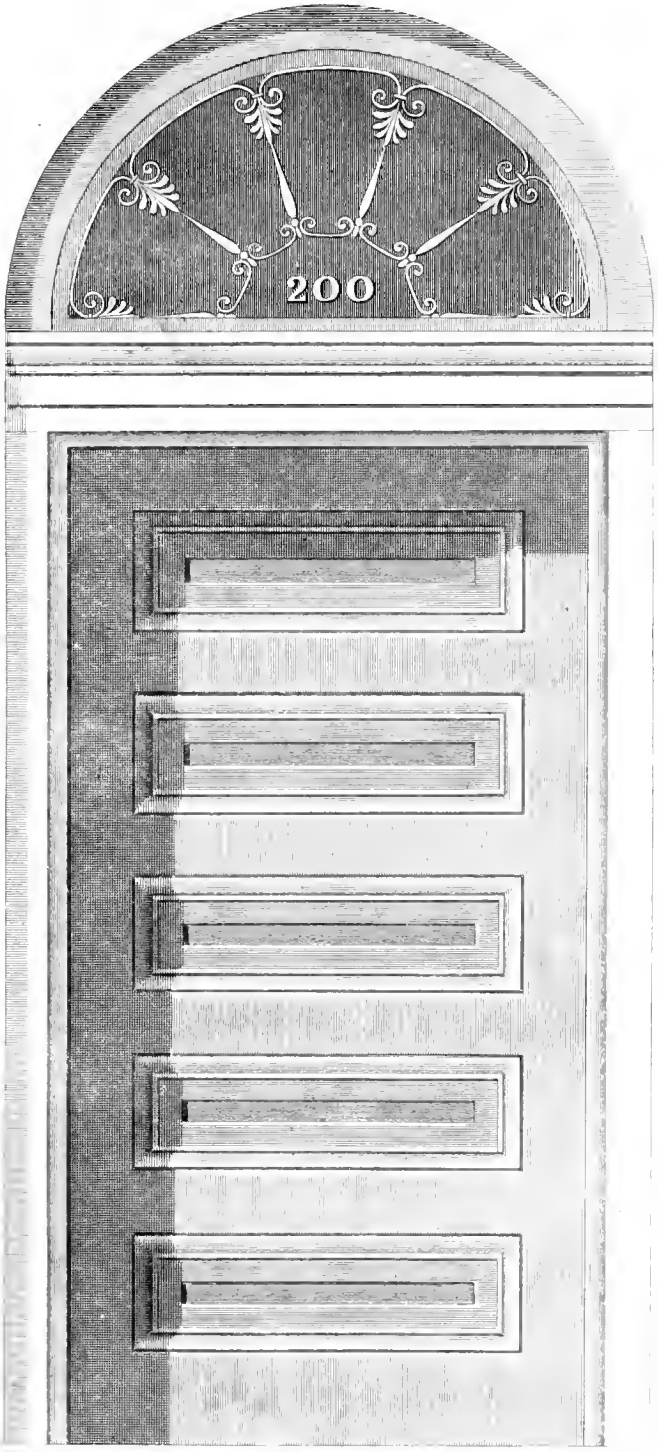
Secondly. Make the knuckle of the bottom hinge to project beyond the perpendicular of the top hinge about the one-eighth of an inch: this will throw the door off the floor.

Note. The centre of the top hinge must project a little beyond the surface of the door, if the hinge is let equally into the door and into the jamb; otherwise, if the centre lie in the surface of the door, it ought to be placed at the very top, which is seldom done, except when hung with centres.

Thirdly. Fix the jamb, on which the door hangs, out of the plumb line, so that the top of the jamb may incline to the opposite jamb about one-eighth part of an inch: this will contribute to the effect of clearing the door from the floor.

DOOR.

PLATE 15.

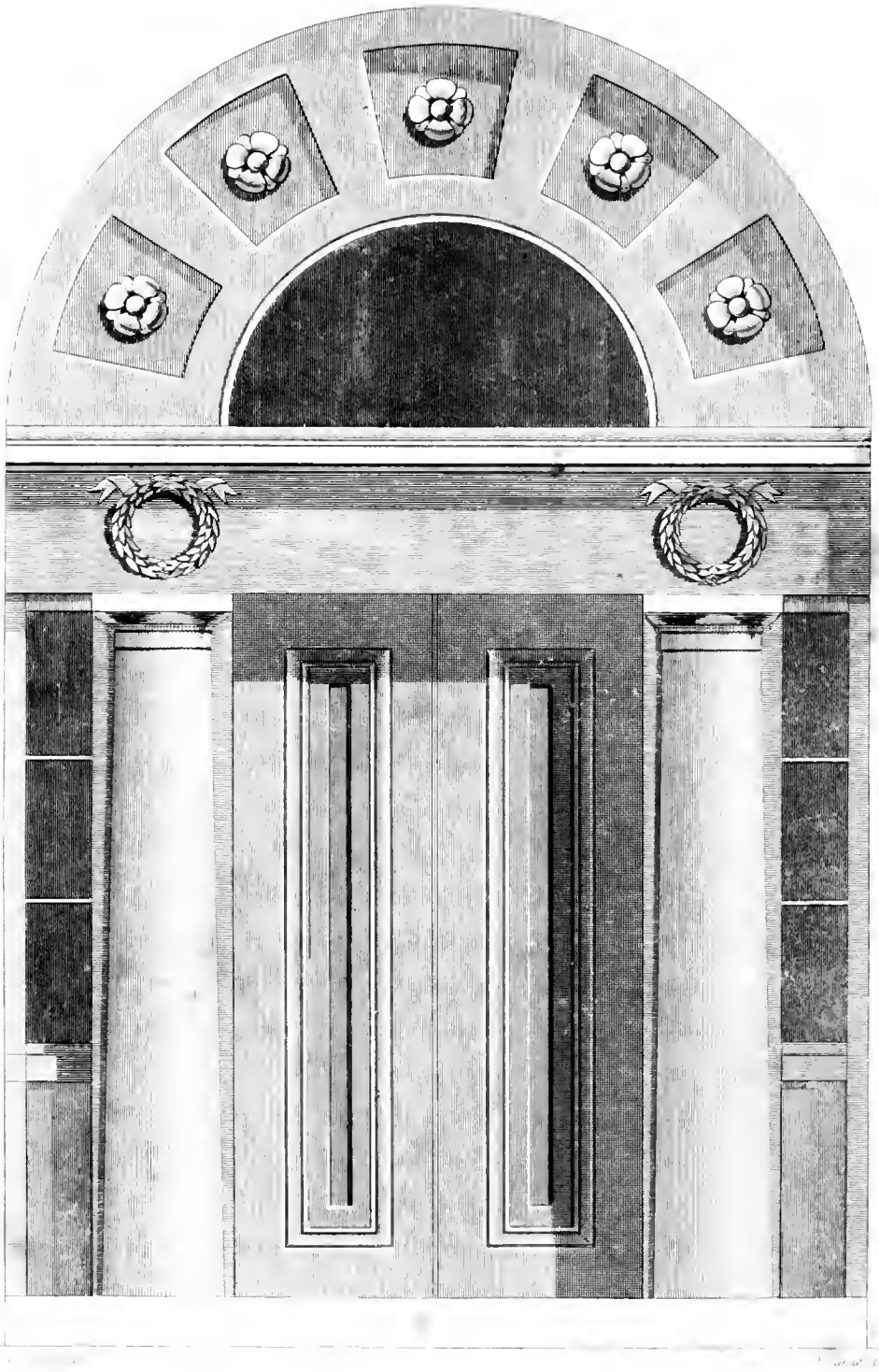


Scale.

Inches 1 2 3 4 5 Feet

DOOR.

PLATE 16.



Scale.

Feet

Fourthly. Make the door, when shut, to project at the bottom towards the inside of the room, about one-eighth of an inch, which may be effected by giving the rebate the quantity of inclination requisite.

Note. Although any of the above methods, properly applied, will make a door swing sufficiently clear of the floor, yet as each one separately will require to be done in so great a degree as to offend the eye, I do not recommend it in nice work, but would rather advise a combination of them all, to be used thus:

Raise the floor about one-eighth of an inch under the door; make the jamb on which the door hangs incline to the opposite jamb about one quarter of an inch; make each rebate that stops the door project at the bottom one-eighth of an inch to that side of the room on which the door opens. Now these several methods practised in the above small degrees, which will not be perceptible, will throw the door sufficiently out of the level, when opened to a square; that is, it will be at least half an inch, when the height of the door is double its width.

Fifthly. An invention has been introduced called *rising hinges*, which are made of a spiral groove winding round the knuckle; this construction of hinge requires that the door should be bevelled at the top next to the ledge or door-catch, as much as the hinge rises in one quarter of its revolution.

Sixthly. This may also be effected by adopting a door in the form of the antique doors; that is, the bottom to be wider than the top, the jambs having the same inclination.

PLATE 15.

A design for a single door, in proportion with a house from eighteen to twenty-three feet front, in the modern style of finish. The proportions of its several parts can be ascertained by referring to the annexed scale of feet and inches.

PLATE 16.

A design for an external folding door, calculated for a double house, drawn to a scale of inches and feet.

PLATE 17.

Two designs for the dressings of internal doors. The Fig. 1 is adapted for the parlor and drawing-room floors; and the example Fig. 2 most appropriate for the chamber rooms. The doors may be arranged with three, four, or five panels, to correspond with the bold or light style of its adjoining features; and the folding doors of the same room would look better to be finished with the additional height of a panel ranged with those of the single doors.

PLATE 18, 19.

Ten designs for the pilasters of parlor and chamber doors, drawn full size.

PLATE 20.

Five designs for the architraves of internal and external doors, showing their profiles, full size.

PLATE 21.

In this Plate are given the lines of a pitch pediment frontispiece. In this the column is made ten diameters in height. This is on a supposition that the door is for a town house with a narrow front; in which case the true proportion of the Orders may be dispensed with, and regard had to the general proportion of the building; but in country houses, where the front may be well proportioned, the nearer we adhere to the Orders, the better will be the appearance in general. In fixing on the size of a door for the front of a house, it is better to make it rather too large than too small, as few things will make a house look meaner, than a contracted front door; and, where it will admit of it, the door should be as wide as half its height.

PLATE 22.

In this Plate, the foregoing subject is shaded. I will here observe, that the light should always come from the left side, and at an angle of forty-five degrees, or on a mitre both horizontally and vertically, by which the shadows of projecting moulding, &c. will be always equal to their projections. This will be better understood, by examining the Plate.

As in geometrical drawings, the relief or projection of the object can only be shown by the shading, the Student should make it his business to understand the effects of light and shade. In those parts that stand forward, or project, the shade should be strong, and the part receiving the light should be bright; and, as the distance increases, both lights and shades should be weaker. All moulding, whether swelling or coving, will have both a stronger light and shade, than plane surfaces exposed to an equal degree of light; and all surfaces on the same plane, not in a shadow, should have the same tint or degree of shade.

DOOR.

PLATE 17.

Fig. 1.

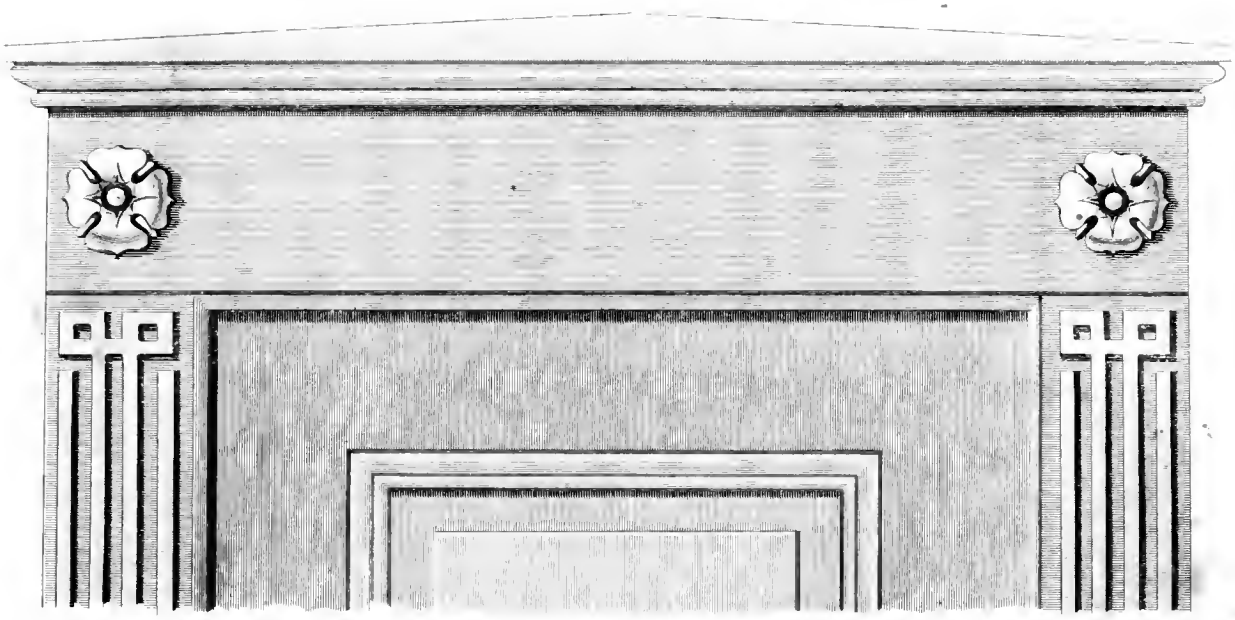
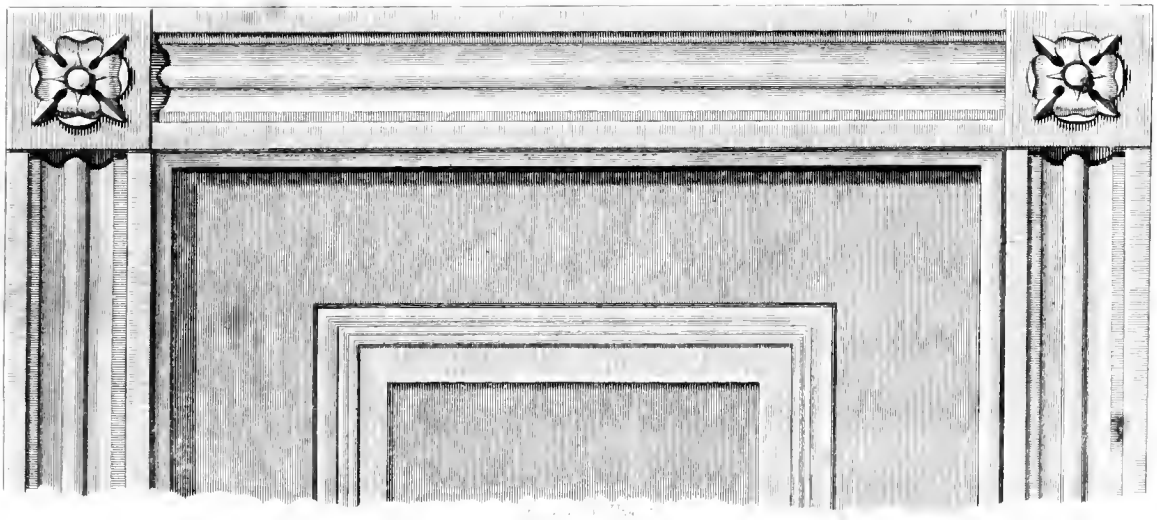


Fig. 2



Inches *and* *Feet*

1 2 3 4 5 6 7 8 9 10 11 12

DOOR.

PLATE 18.

Fig. 1.

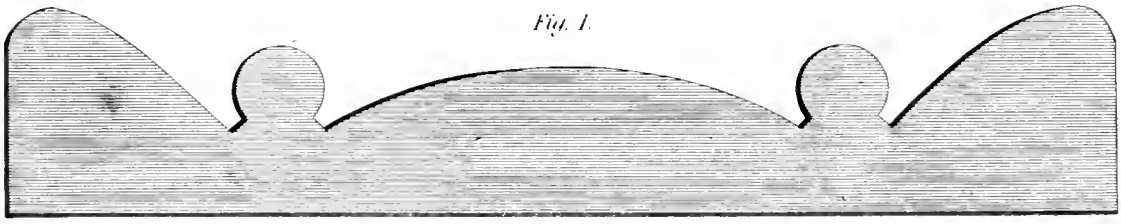


Fig. 2.

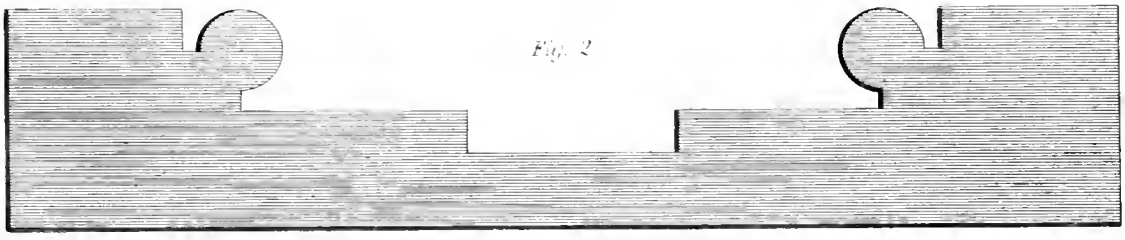


Fig. 3.

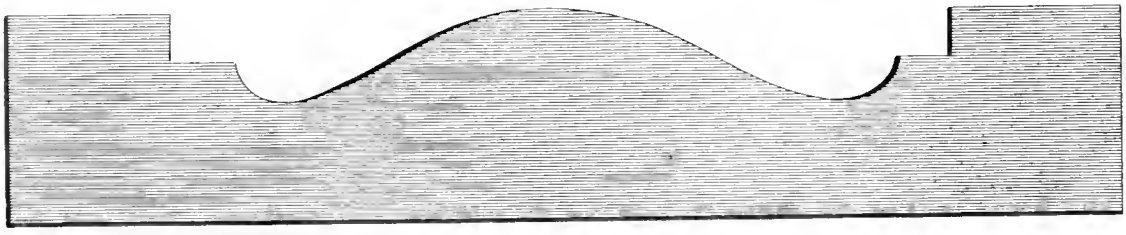


Fig. 4.

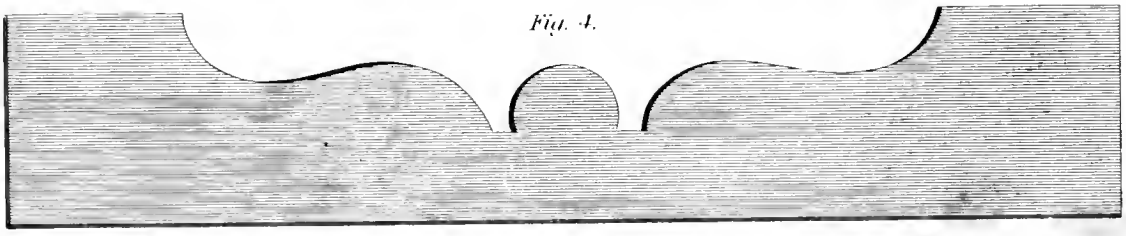
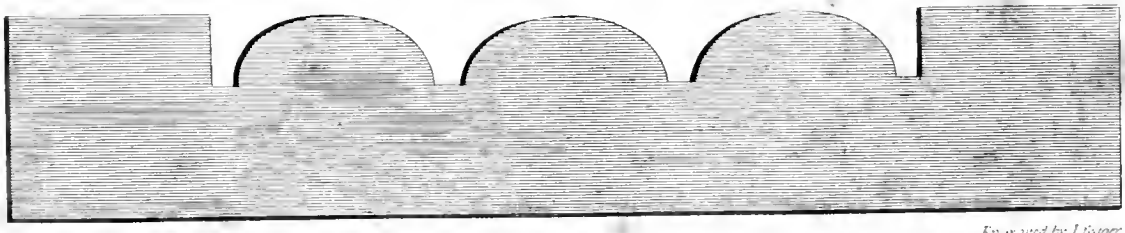


Fig. 5.



Designed & drawn by J. Hartland. *Engraved by J. Jaeger.*

DOOR.

PLATE 19.

Fig 6.

Fig. 7.

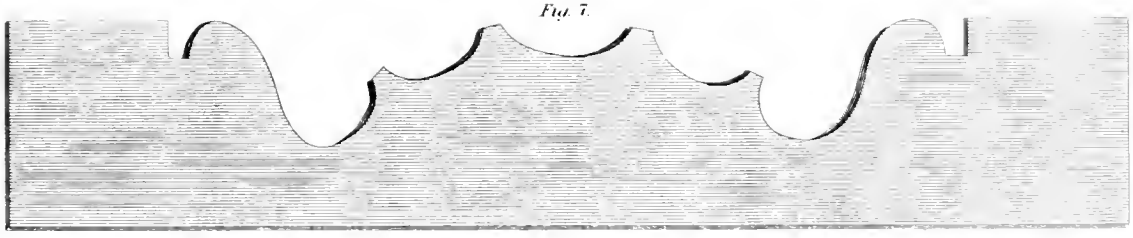


Fig. 8.

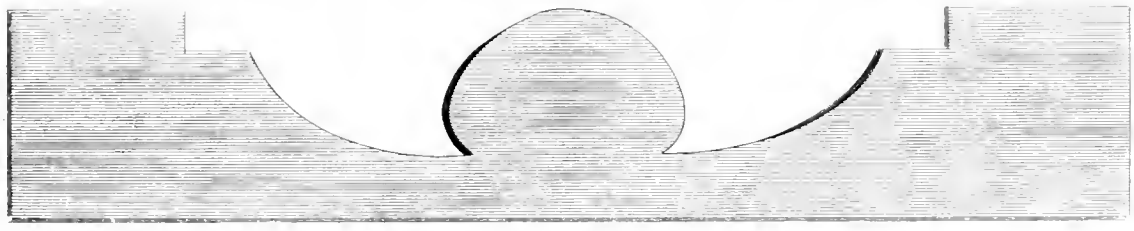
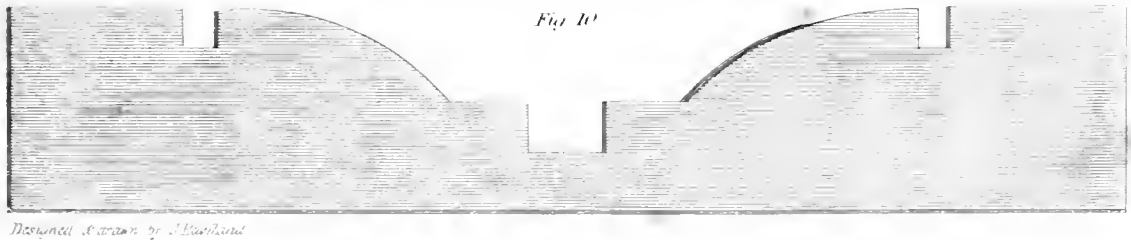


Fig. 9.

Fig. 10



Designed & drawn by J. Buckland

DOOR.

PLATE 20.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

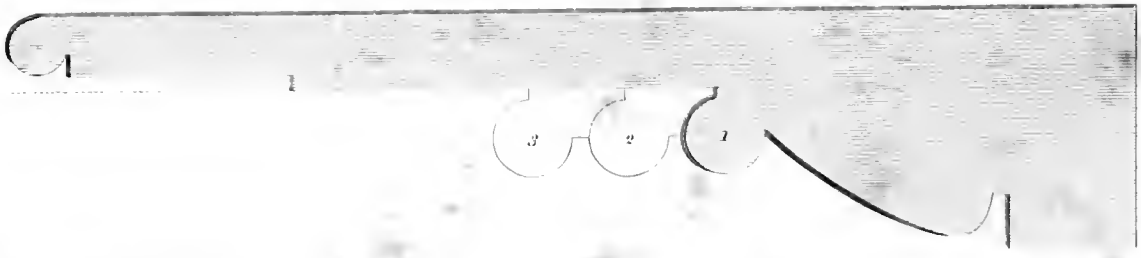


PLATE 21.

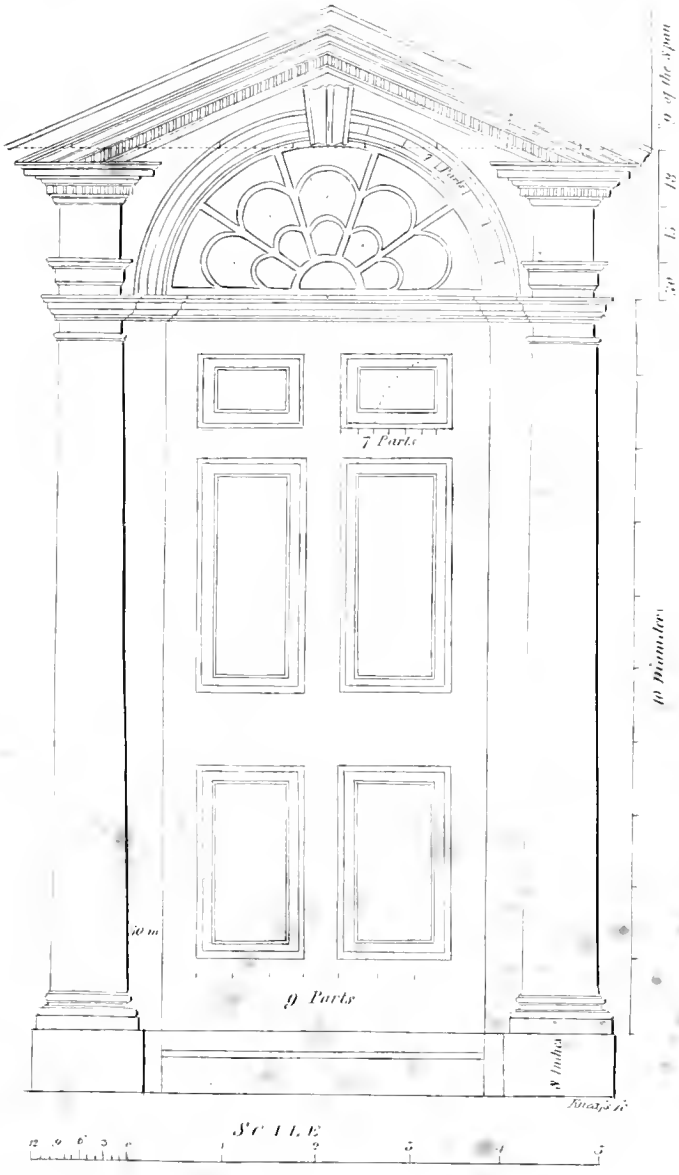
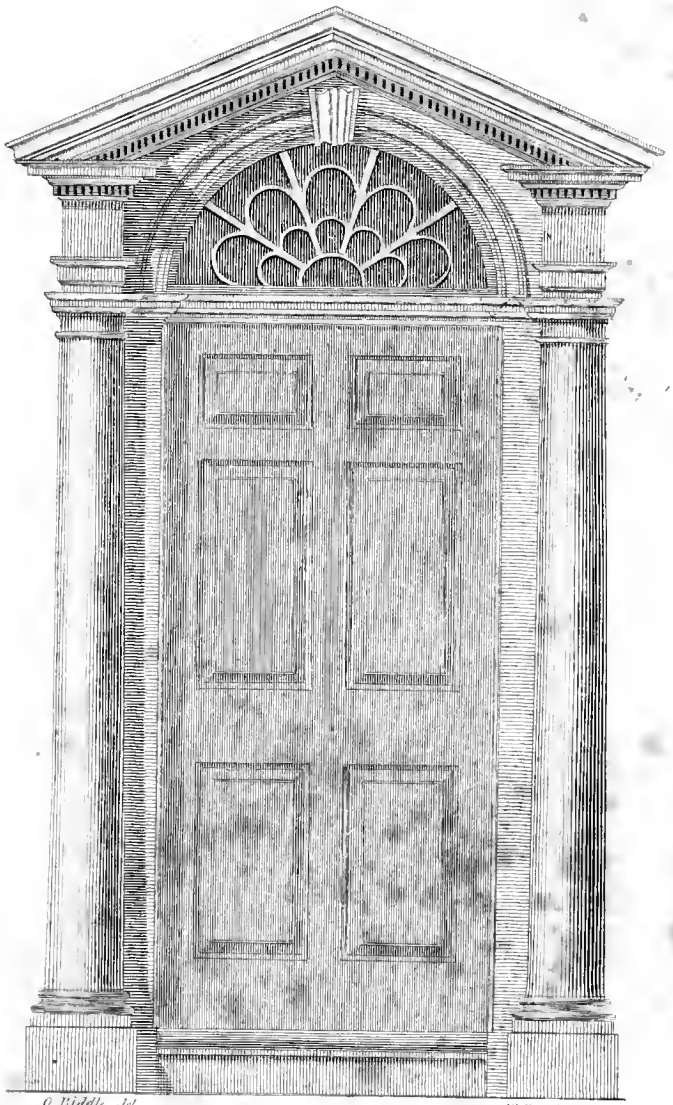

6 of the span
12
7 Parts
7 Parts
10 Diameters
60 m
9 Parts
8 Inches
SCALE
12 9 6 3 0
1
2
3
4
5

PLATE 22.



O. Biddle Jel. *W. Kneass Jr.*

PLATE 23.

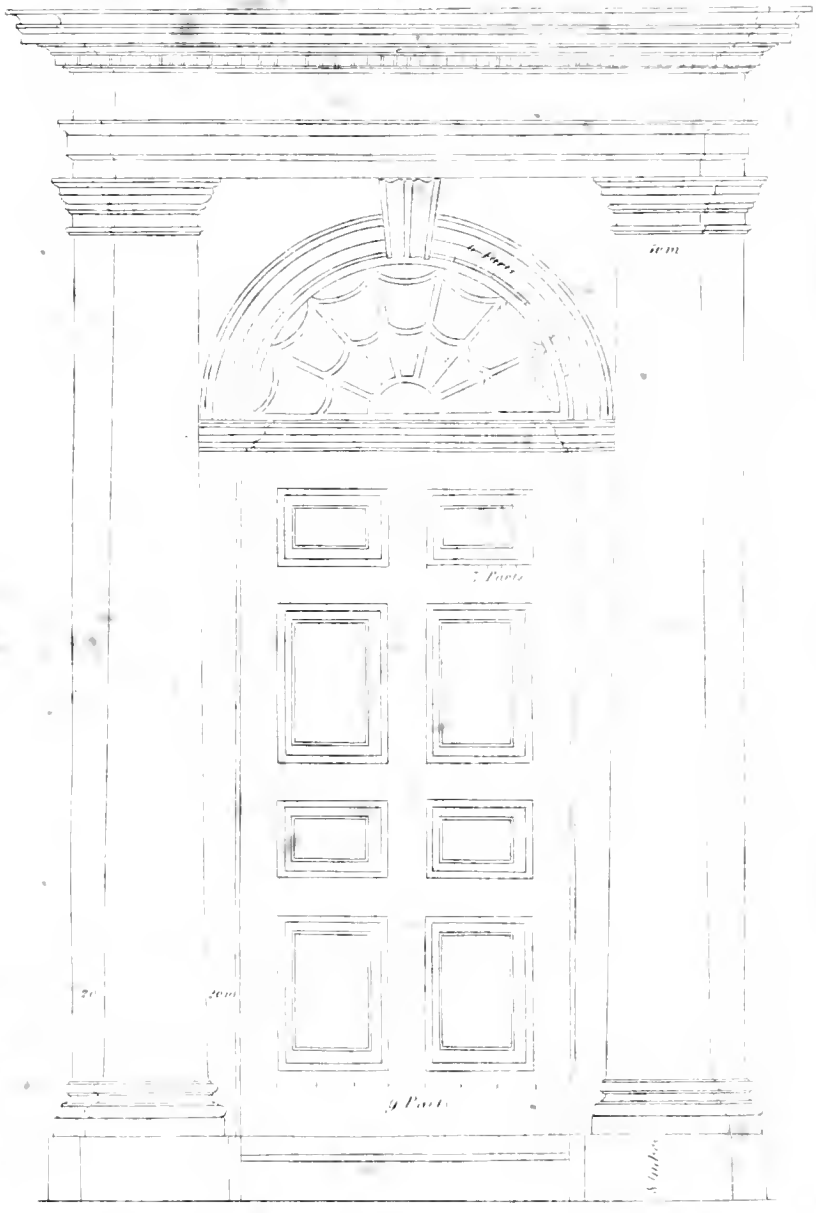
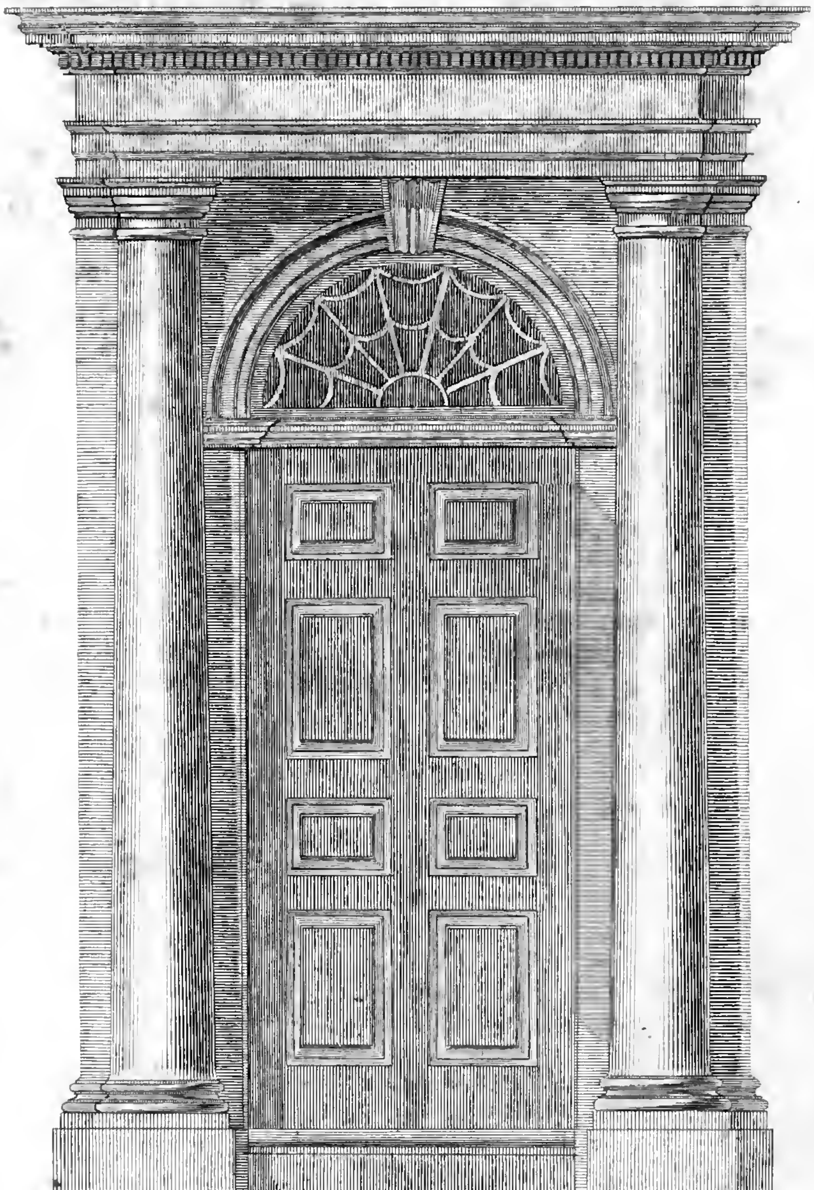


PLATE 24.



O. Biddle delin — W. Jones sc

PLATE 23.

In this Plate is given a flat pediment frontispiece. The observations made on the preceding example, with respect to general proportions, will apply to this.

After the Student has fixed on the size of his door, he will draw the arch, and divide the half-round of that into six parts; one of which is the width of the key at bottom, and two of them will be its height, which is also the top of the columns. He may then find the diameter, and make a scale for proportioning the mouldings.

PLATE 24.

Is the foregoing, shaded.

WINDOW.

Windows (from the Danish *vindue*, or the Welsh *wynt-dor*, a passage for the wind), those apertures in walls through which light is transmitted to the interior of the building. Windows are generally of a rectangular form, the sides or jambs being vertical, and the bottom and lintel horizontal. Semicircular windows have a very elegant effect, particularly in circular buildings, as was generally the practice of the Romans; but those that are finished with segments, or semi-ellipses, are not so beautiful; and much less so are such as are constructed of entire circles or ellipses, for which few or no precedents are to be found in the buildings of the ancients. Windows must be proportioned in height and width to the principal rooms. The dressings of windows are the sill, and the insisting architrave, surrounding the upper part, crowned by a cornice and frieze. The breadth of the architrave may be one-sixth of that of the aperture; the frieze the same; the height of the cornice will depend upon the number of mouldings; if very few, it may be of less height than the cornice. Windows should be so placed with respect to the principal rooms, or dining and drawing rooms, as to be equally distant from each end of the apartment, and equidistantly distributed in the principal front, of one size, with their edges or sides in the same vertical lines. This adjustment will frequently be attended with difficulties; and to accommodate the principle, an alteration of the proportions, in a small degree, will sometimes be necessary. In houses of the middle class, where economy is an equal consideration with elegance or beauty, the windows frequently reach as high as the cornice, or even so high as to cut the cornice, wholly, or in part; a mutilation that destroys the beauty of the finishing. In such cases, it would be better to have more lofty stories or lower windows. In large edifices, where proportions are considered, the spaces above the windows are more ample, and allow a more elegant finish, with a greater repose for the eye.

Windows ought to be made vertically one above the other, and not too near the angles of the building; and in large edifices where the walls are thick, their jambs ought to be splayed or bevelled, for a more full distribution of light. Lofty windows, descending to the floor, or nearly so, with a projecting balcony in front of the building, defended by a railing of cast or wrought iron, are both healthy and agreeable.

Sky-lights, in cold climates like ours, are productive of many inconveniences, as they admit of cold air, damps, rain, and snow, and thereby waste the heat generated in the house. They ought therefore never to be admitted, except for stairs and halls: when this admission is necessary, their apertures should increase in dimensions, so as not to hinder the passage of the rays.

Sash (from the French *chassis*, a frame) a chequered frame for holding the squares of glass or windows, and so formed as to be let up and down by means of pulleys. Sashes are either single or double hung.

Sash-Frame, the wooden frame in which the sashes are fitted for the convenience of sliding up or down, or side-ways, as the nature of the apartment to be lighted may require. When one or both sashes are to be moved vertically, they are commonly equipoised by weights; and the weights are made to run in vertical trunks, or cases, formed in the sides of the frames, which are therefore said to be cased; but when the sides are not made hollow for weights, the frame is said to be solid. In a sash-frame, the under side of the head is most commonly disposed in the same surface as the soffit, or intrados, of the stone or brick head of the window on the outside; consequently, it partakes of the shape of the head of the window, whether straight or circular. In a cased sash-frame, each case consists of four pieces; the inside piece, on each side, or that next the aperture, is most commonly disposed in the same plane with the jamb of the stone, or side of the aperture, on the outside, the two sides forming parallel: these two pieces are called *Pulley-Pieces*, from their containing pulleys, over which the ropes pass, by which the sashes and weights are suspended. The other three parts of each trunk are called *linings;* that parallel to the pulley-piece, and next to the jamb, on either side, is called the *back lining;* the one next the outside, and parallel to the face of the wall, is the *outside lining;* and the remaining one, next to the inside of the room, is denominated *the inside lining*. The best made sash-frames have the pulley-pieces tongued into the outside and inside linings: the back lining is generally tongued into the outside, and nailed to the edge of the inside lining: on each pulley-piece two channels, of equal breadth, for the edges of the sashes to run in, are formed by nailing a slip of wood round the inner margin of the pulley-piece, and suffering the outside lining to project within it; between which a narrow slip is inserted in a groove, left in the middle of the intervening space. As the edge of this slip is generally rounded, it is called *the parting bead;* and the inner slip, for the same reason, is termed *the inside bead;* while the edge of the outer lining is called *the outside bead*. Within the case, there is also a vertical slip, suspended from the head, and passing longitudinally through the middle of the hollow space, for separating the two weights, which is therefore called *the parting slip*. The head, sill, and inside linings, have generally each a groove next to the inside of the room; the groove in the head and sill is commonly three-eighths of an inch from the edge next to the opening; that in the head is for inserting the edge of the soffit, and that in the sill for receiving the edge of the capping bead, upon the upper edge of the back. The grooves, in the inside lining, are for the edges of the back lining of

the boxing; the distance of these grooves from the inner edge of the inside lining, depends upon the depth of the boxing and the distance of each line of hinges from the inner edge of the inside lining, or of that next to the opening. The line of hinges is generally about the eighth of an inch from the inner edge of the inside lining; so that the shutters, soffit, and capping bead, may have their terminating edges with the sash-frame of the same margin all round; that is, at the same distance as the inner edge of the sash-frame: this, however, is not positively necessary; but may be varied at the discretion of the architect, or workman.

The line of hinges being determined, the depth of the boxing is found by adding to the thickness of the wall, that of the inside finishing, whether of plaster alone, or of lath and plaster (the former requiring about an inch, and the latter two and a quarter inches); and subtracting from the sum, the thickness of the sash-frame, and its distance from the outside of the wall; then, if the remainder be equal to, or exceed half the distance of the hinge-line, such half distance is the breadth of both the boxing and the shutter: it must, however, be observed, that the outer edge of the shutter must not be rebated, as that would prevent the edges of the lathing coming close to the architrave, or margin style, which forms the side of the boxing, opposite to the inner lining of the sash-frame, when each shutter consists of one piece only: to remedy this, each shutter must consist of two folds, viz. a front part, and back flap; and the breadth of the boxing must be contracted, either by introducing a margin style at the edge of each boxing, or, if one was necessary before, by making it broader: then the thickness of the two folds will be the neat distance of the groove from the line of hinges. If, on the other hand, the remainder before mentioned be less than the half distance of the hinge lines, it is the breadth of the boxing: divide the half distance between the hinge lines, by the breadth of the boxing, and the quotient will give the number of folds; and if there be a remainder, there must be one fold more than is shown by the quotient.

The aggregate, or sum of all the folds, is the neat depth of the boxing: but, in order to make the folds clear each other, and the back of the boxing, add the eighth or tenth part of an inch for each fold. Thus, suppose the wall to be of eighteen-inch brick-work, and the finishing, within, to be lath and plaster; suppose, also, the breadth of the window to be four feet, the sash-frame six inches thick, and its distance from the wall four inches: then $20\frac{1}{4}$ inches is the thickness of the wall and finishing; the thickness of the sash-frame, and its distance from the face of the wall, are together 10 inches; this, taken from $20\frac{1}{4}$ inches, gives $10\frac{1}{4}$ inches for a remainder, which is the breadth both of the boxing and of the shutter, because $10\frac{1}{4}$ inches are less than 24 inches, the half distance between the lines of hinges: $10\frac{1}{4}$ is contained twice in 24 inches, with a remainder; there are, therefore, three folds, viz. a front fold and two back flaps: suppose the front fold to be $1\frac{1}{2}$ inch thick, each back $1\frac{1}{4}$ inch thick; then $1\frac{1}{2} + 1\frac{1}{4} + 1\frac{1}{4} = 4$ inches; and because there are three folds, add 3-10 of an inch more, and the depth of the boxing will be $4\frac{3}{4}$ inches.

WINDOW.

PLATE 25.

A design for a dormer window.

PLATE 26.

A design for a single window with its external shutters, showing the manner of finishing the panels, &c. on both sides.

PLATE 27.

Five designs for sash window bars, full size:—

Fig. 1. Gothic astragal and hollow bar.
Fig. 2. Simple metal bar, for shop fronts.
Fig. 3. Quirked astragal and hollow bar.
Fig. 4. Cima recta and square bar.
Fig. 5. Quarter round and square bar.
Fig. 6. Section of the meeting bar, with a small proportion of the style fixed to each.
Fig. 7, shows the method of joining the intersecting bars, with the method of doweling them together.
Fig. 8, the elevation of the intersection, showing a part of each branch or bar.

PLATE 28.

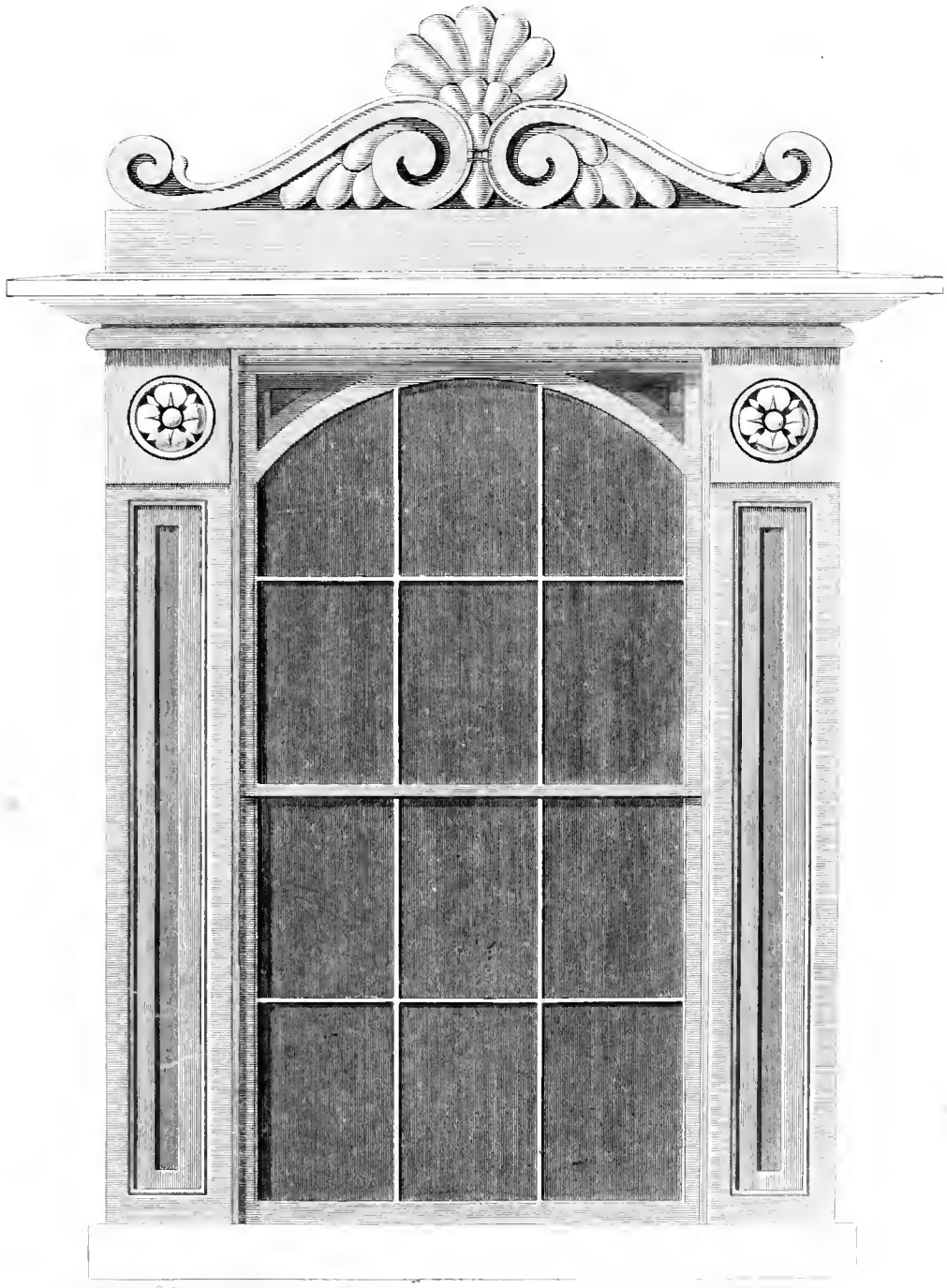
A design for a Venetian window: the panel and pilaster represented in the lower front, show the interior finish, and are of course omitted on the external side.

PLATE 29,

Is a dormer window. The circular part of the sash is Gothic; in drawing which, the compasses should be kept at the same extent as in drawing the arch, and the centre carried out on the top of the impost. If fluting or dentils are used for dormers, they should be larger in their proportions than in common work; and the pitch of the pediment may be rather steeper than in frontispieces, as the height will take off something from the pitch.

WINDOW.

PLATE 25.

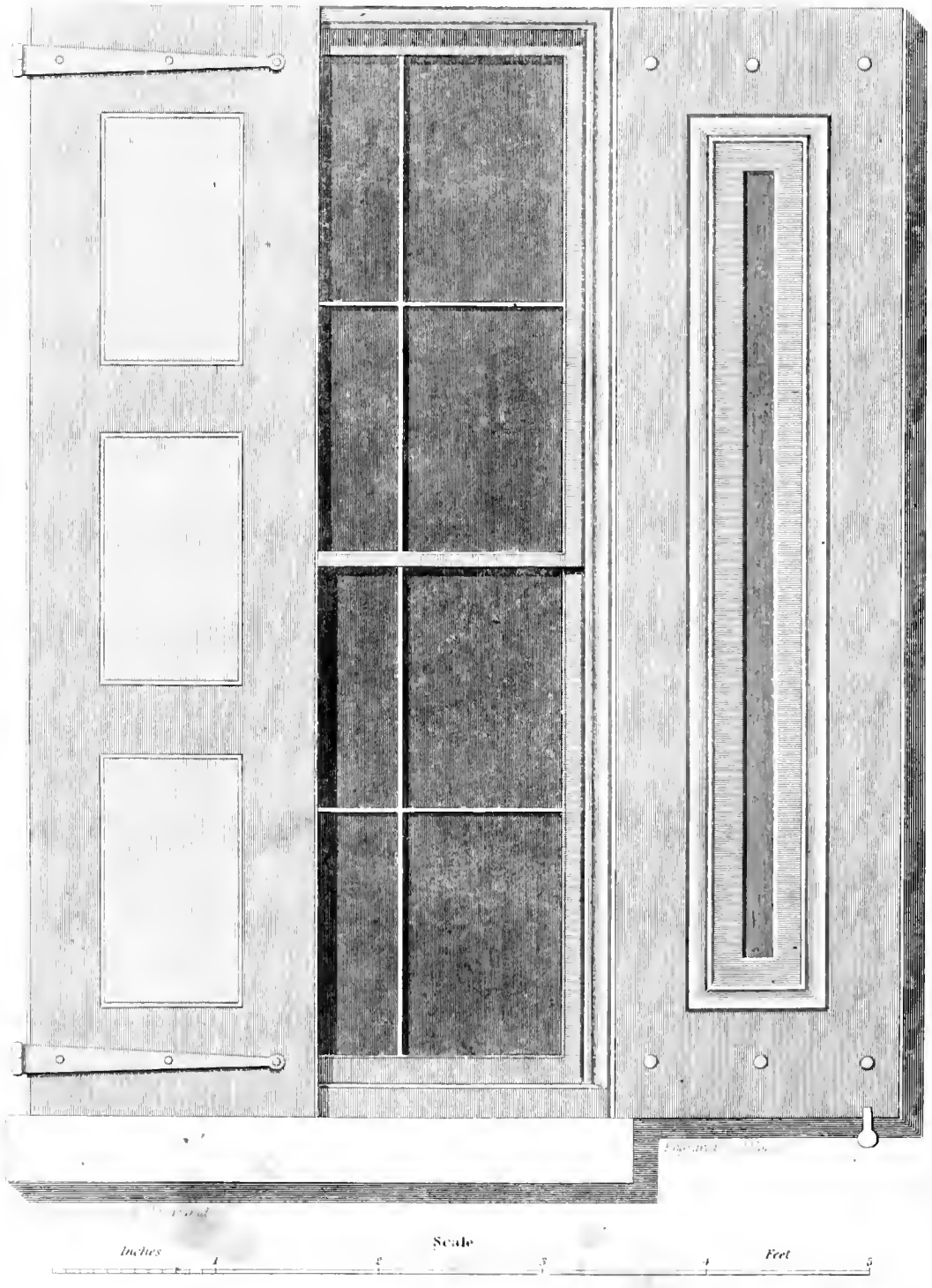


Scale.

Inches 1 2 3 4 5 Feet 6

WINDOW.

PLATE 26.



WINDOW.

PLATE 27.

Fig. 1.

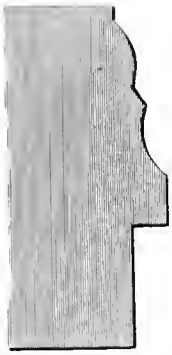


Fig. 2.

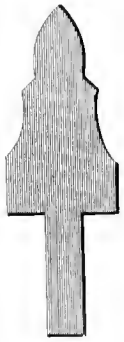


Fig. 3.

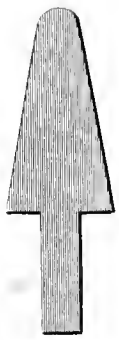


Fig. 4.

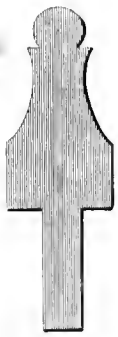


Fig. 5.

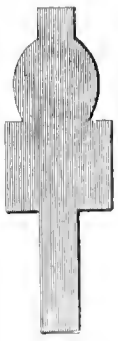


Fig. 6.

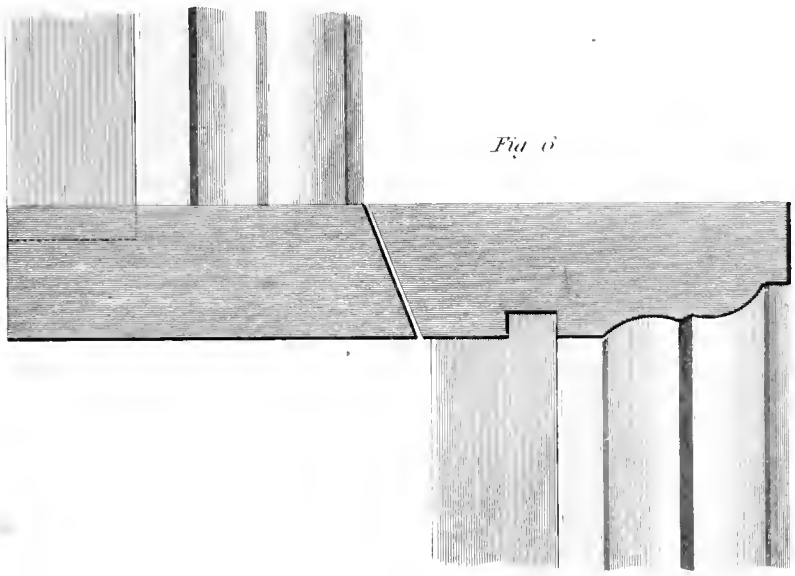


Fig. 7.

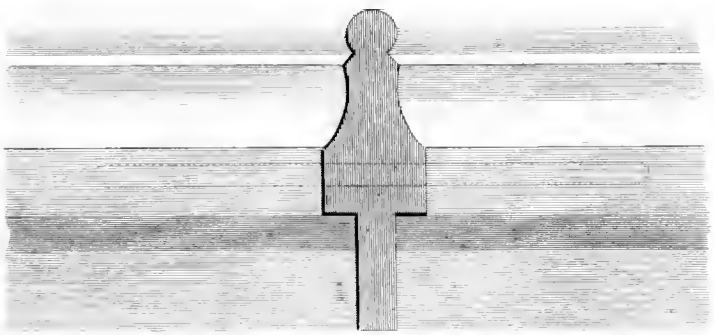
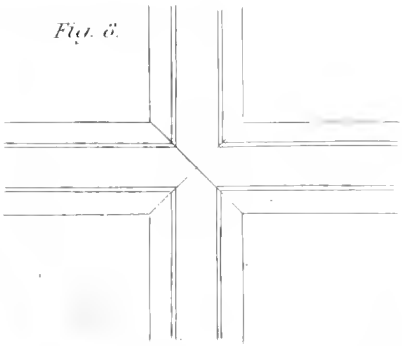
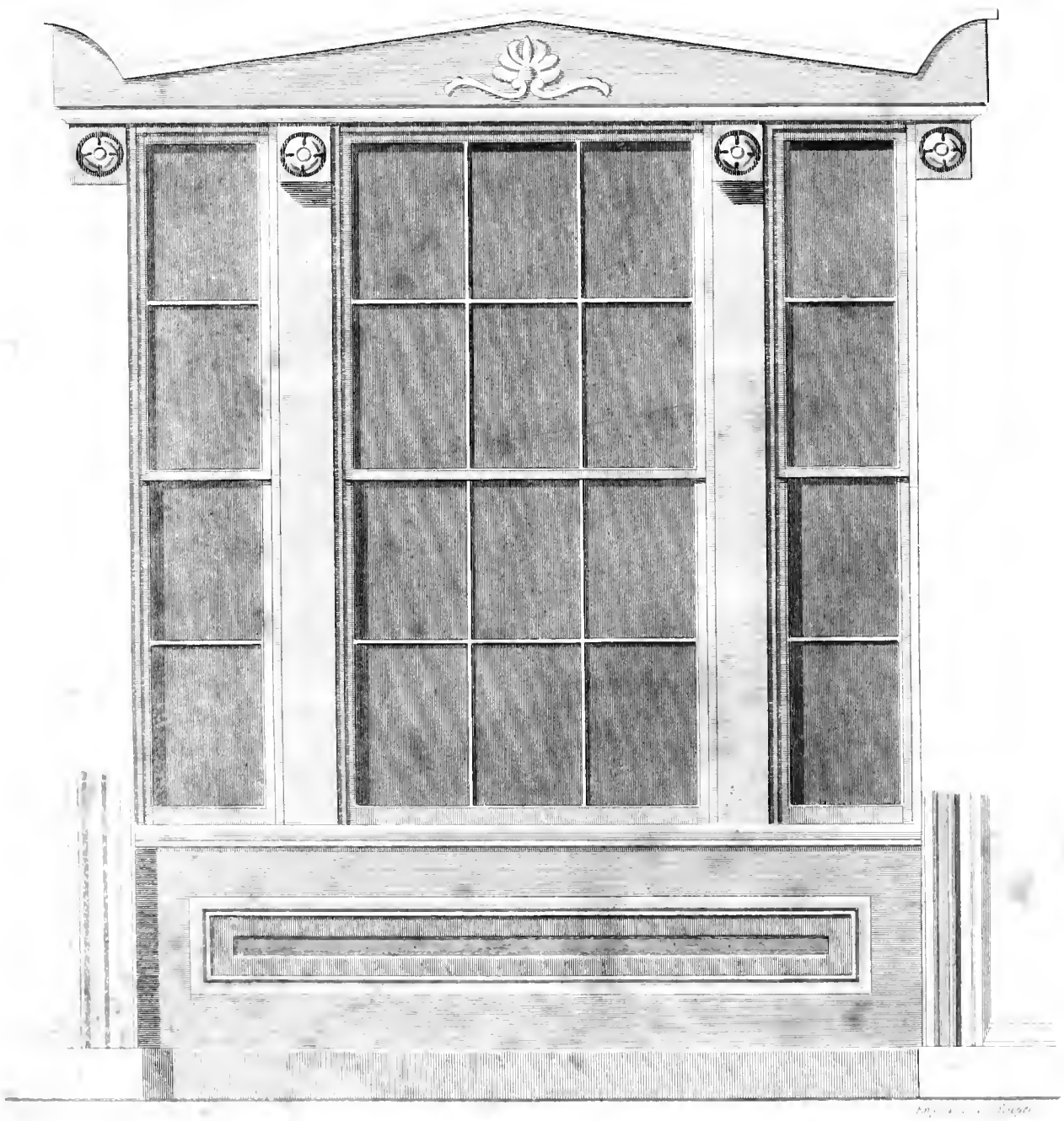


Fig. 8.



WINDOW.

PLATE 28.



Scale.

Inches 1 2 3 1 5 Feet 6

PLATE 29.

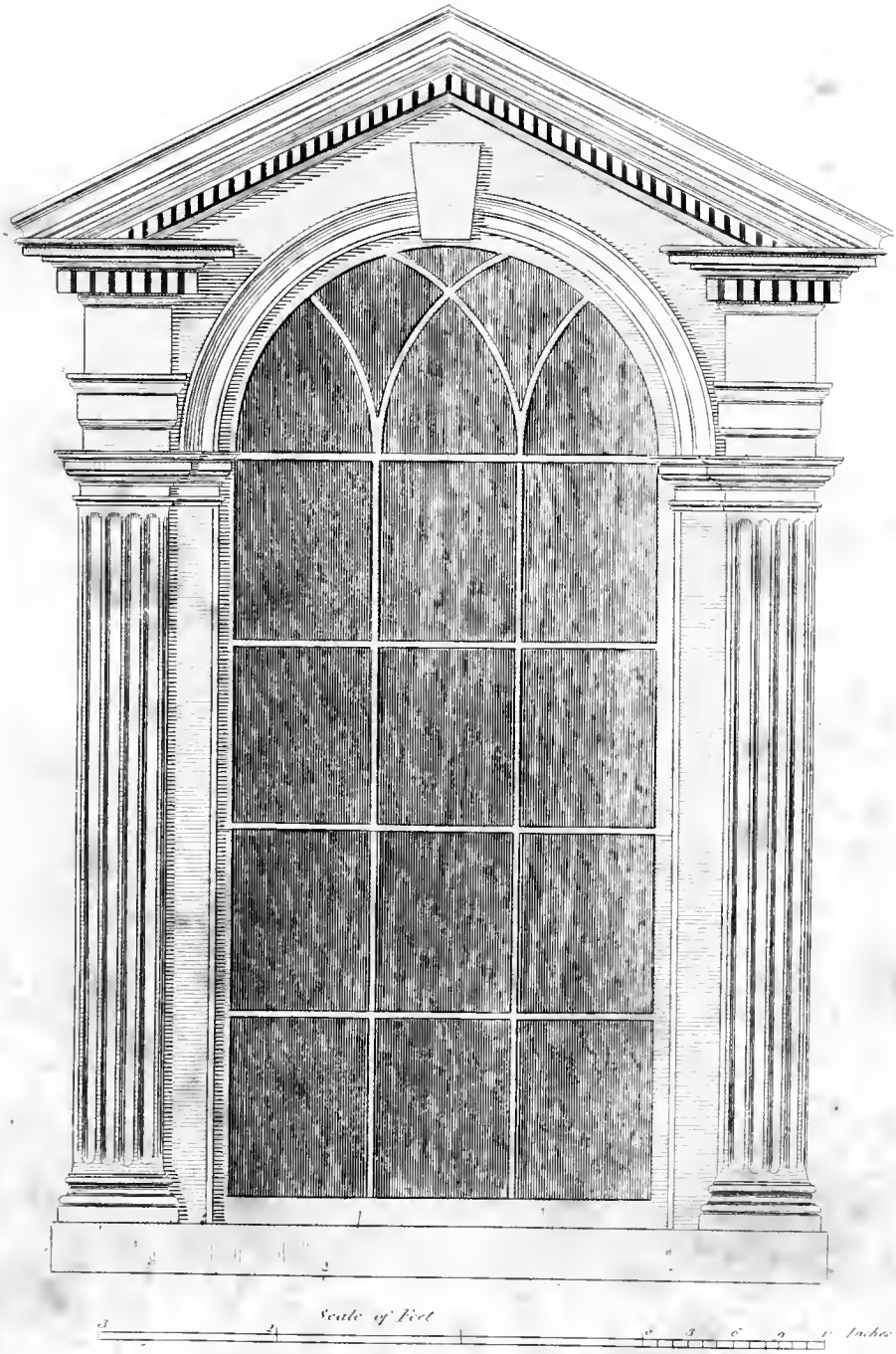


PLATE 30.

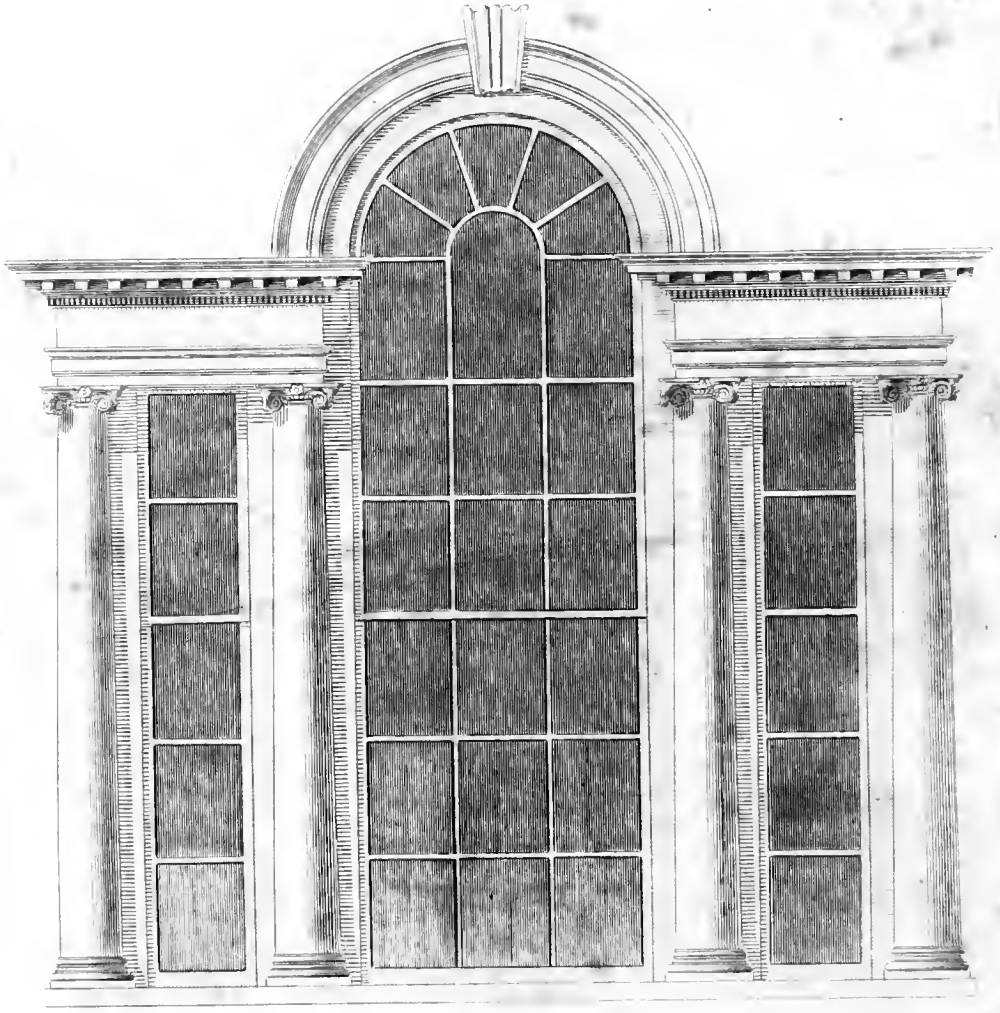


PLATE 30,

Is a Venetian window of the Ionic order. In giving a design for a window of this kind, the size of the glass should be made to correspond with the entablature, so that it will be equal in height to one or two lights; and the sashes in the side-window, to range with the middle one.

GENERAL OBSERVATIONS.

The four Orders of Architecture have been selected from such of the remains of ancient buildings, as are supposed to be the most beautiful; and Palladio has been generally allowed to have been the best judge among the moderns, who have given the proportions of the remains of Antiquity. The proportions in this book are pretty nearly the same as his. The differences are principally these: There being no remains of Antiquity in the Tuscan Order with an entablature, and Palladio having given a very poor one; succeeding Moderns have given that Order an entablature near the proportion of the others, which I have adopted. The Doric Order has no example of a Pedestal among the Ancients; and in the most admired buildings of Antiquity, in that Order, the Columns have no base; and I believe there is no example remaining of the Ionic Order having modillions, but dentils only; though, of late, modillions have been as frequently applied as dentils. In the foregoing examples, I have given to the Tuscan and Doric Order one-fifth of the height, exclusive of the Pedestal, for the entablature; the Ionic and Corinthian each have one-sixth. In situations where there are one or more Orders over another, this proportion in the upper should be altered; the richer Order always being uppermost. The Ionic and Corinthian may then have one-fifth, for the entablature. These proportions are all for small buildings; but if the buildings are large, exceeding 40 feet in height, the entablature should increase proportionally. If one Order only is used, the Tuscan and Doric may have one-fourth; Ionic and Corinthian, one-fifth; and if several Orders are used, the Ionic and Corinthian may have each one-fourth of the height of the Order, exclusive of the Pedestal, for the height of the entablature.

CHIMNEY-PIECES.

As the Egyptians, the Greeks, and the Romans, to whom architecture is so much indebted in other respects, lived in warm climates, where fires in the apartments were seldom or never necessary, they have thrown but few lights on this branch of architecture: amongst the antiquities of Italy, I do not recollect any remains of chimney-pieces. Palladio, indeed, mentions two, the one at Baiæ, and the other near Civita-

Vecchia, which stood in the middle of the rooms, and consisted of columns supporting architraves, whereon were placed the pyramids, or funnels, through which the smoke was conveyed, much after the manner of the fire-place in the Rotunda of Ranelagh Gardens. Scammozzi takes notice of three sorts of chimney-pieces used in Italy in his time. One of these he calls the Roman, the aperture of which is surrounded only with a clumsy architrave: another he calls the Venetian, which is likewise adorned with an architrave, upon which are placed a frieze and cornice, and on the sides thereof are pilasters with consoles; the third sort he calls a *padiglione*. This last he particularly recommends when the walls are thin, it being not hollowed into the wall, as both the other sorts are, but composed of a projecting entablature, supported by consoles, termini, or caryatides, on which the pyramid is placed. This sort of chimney-piece is still very common in Italy; the Dutch are very fond of it; and we find it in many of our old English country-houses. Neither the Italians nor the French, nor indeed any of the continental nations, have ever excelled in the compositions of chimney-pieces. I believe we may justly consider Inigo Jones as the first that arrived at any great degree of perfection in this material branch of the art. Others of our English architects have, since his time, wrought upon his ideas, or furnished good inventions of their own; and England being at present possessed of many ingenious and very able sculptors, one of whom devotes himself to the execution of magnificent chimney-pieces, now happily much in vogue, it may be said, that in this particular we surpass all other nations, not only in point of expense, but likewise in taste of design, and excellence of workmanship. Scammozzi mentions a chimney-piece in one of the public buildings at Venice, executed from his design, as a most uncommon piece of magnificence, having cost upwards of a thousand crowns.

The size of the chimney must depend upon the dimensions of the room wherein it is placed. In the smallest apartments, the width of the aperture is never made less than from three feet, to three feet six inches: in rooms from twenty to twenty-four feet square, or of equal superficial dimensions, it may be four feet wide; in those of twenty-five to thirty, from four to four and a half; and in such as exceed these dimensions, the aperture may be extended to five, or five feet six inches; but should the room be extremely large, (as is frequently the case in halls, galleries, and saloons,) and one chimney of these last dimensions will neither afford sufficient heat to warm the room, nor sufficient space around it for the company, it will be much more convenient, and far handsomer, to have two chimney-pieces of a moderate size, than a single one exceedingly large, all the parts of which would appear clumsy and disproportioned to the other decorations of the room.

The chimney should always be situated so as to be immediately seen by those who enter, that they may not have the persons already in the room, who are generally seated about the fire, to search for. The middle of the side partition wall is the properest place in halls, saloons, and other rooms of passage, to which the principal entrance is commonly in the middle of the front, or of the back wall; but, in drawing-rooms, dressing-rooms, and the like, the middle of the back wall is the best situation, the chimney being then farthest removed from the doors of communication. The case is the same with respect to galleries and libraries, where doors of entrance are generally either at one or at both ends. In bed-chambers, the chimney is always placed in the middle of one of the side partition walls; and in closets, or other very small places, it is, to save room, sometimes placed in one corner.

Whenever two chimneys are introduced in the same room, they must be regularly placed, either directly facing each other, if in different walls, or at equal distances from the centre of the wall in which they both are placed. The Italians frequently put their chimneys in the front walls, between the windows, for the benefit of looking out while sitting by the fire: but this must be avoided, for by so doing, that side of the room becomes crowded with ornaments, and the other sides are left too bare; the front walls are much weakened by the funnels; and the chimney shafts at the top of the building, which must necessarily be carried higher than the ridges of the roofs, have, from their great length, a very disagreeable effect, and are very liable to be blown down.

In large buildings, when the walls are of a considerable thickness, the funnels are carried up in the thickness of the walls, but in small ones this cannot be done; the flues and chimney-pieces must necessarily advance forward into the rooms, which, when the break is considerable, has a very bad effect: and therefore, when room can be spared, it will always be best, either in show or state apartments, to make niches or arched recesses on each side; and in lodging-rooms, presses, or closets, either covered with the paper, or finished in any manner suited to the rest of the room. By these means, the cornice, or entablature of the room, may be carried round without breaks, the ceiling be perfectly regular, and the chimney-piece have no more apparent projection than may be necessary to give to its ornaments their proper relief.

The proportion of the apertures of chimney-pieces, of a moderate size, is generally near a square; in small ones a trifle higher, and in large ones somewhat lower. Their ornaments consist of architraves, friezes, cornices, columns, pilasters, termini, caryatides, consoles, and all kinds of ornaments of sculpture, representing animal or vegetable productions of nature; likewise vases, pateræ, trophies of various kinds, and instruments or symbols of religion, arts, arms, letters, and commerce. In designing them, regard must be had to the nature of the place where they are to be employed. Such as are intended for halls, guard-rooms, saloons, galleries, and other considerable places, must be composed of large parts, few in number, of distinct and simple forms, and having a bold relief; but chimney-pieces for drawing-rooms, dressing-rooms, bed-chambers, and such like, may be of a more delicate and complicated composition. The workmanship of all chimney-pieces must be perfectly well finished, like all other objects liable to a close inspection: and the ornaments, figures, and profiles, both in form, proportion, and quantity, must be suited to the other parts of the room, and be allusive to the uses for which it is intended. All nudities, and indecent representations, must be avoided, both in chimney-pieces and in every other ornament of apartments to which children, ladies, and other modest, grave persons have constant recourse; together with all representations capable of exciting horror, grief, disgust, or any gloomy, unpleasant sensations.

Chimney-pieces are made either of stone, marble, or of a mixture of these, with wood, scagliola, or moula, or some other unfragile substances. Those of marble are most costly, but they are also most elegant, and the only ones used in highly finished apartments, where they are made either of white or variegated marbles, sometimes inlaid and decorated with the materials just mentioned. All their ornaments, figures, or profiles, are to be made of the pure white sort; but their friezes, etablets, panels, shafts of columns, and other plain parts, may be of particolored marbles, such as

the yellow of Sienna, the brocatello of Spain, the jasper of Sicily, and many other modern as well as antique marbles. Festoons of flowers, trophies, and foliages, frets, and other such decorations, cut in white statuary marble, and fixed on grounds of these, have a very good effect. But these should never be more than two or at the most three different sorts of colors in the same chimney-piece; all brilliant, and harmonizing with each other.

PLATE 31.

Fig. 1. A design for a console mantle.

Fig. 2. A design for column mantle.

Fig. 3. Profile of fig. 1.

Fig. 4. Profile of fig. 2.

The roses in the square of the console, and feet on the frieze of the column, example, may be made of cast metal, such as brass or iron; and inserted in the aperture, if the mantles are made of marble; if of wood, the whole, including the enrichment case, should be formed out of the same material.

PLATE 32.

Elevations and profiles, full size, of two roscates for the blocks of pilaster and architraves.

Fig. 3. Profile of fig. 1.

Fig. 4. Profile of fig. 2.

PLATE 33, & 34,

Are four examples of Mantles. In ornamenting a Mantle, the young Carpenter would do well to endeavor at an imitation of something natural, and not to cover his work with unmeaning holes and cuttings of a gouge.

Mantles and all other Architectural objects should always have a due proportion of plain surfaces, as a contrast of the ornamented parts. With strict propriety, the faces of Architraves should never be fluted or carved. It very rarely occurs among the beautiful remains of Antiquity, whose Artists seem to have understood true taste much better than those of the present day, or their works would not have excited the admiration of so many ages. The use of composition ornaments, on Mantles, if judiciously chosen and placed, may have a very good effect; but care should be taken, not to overload the work with them; and that there be a proper connexion between the ornaments on different parts.

CHIMNEY PIECES.

PLATE 31.

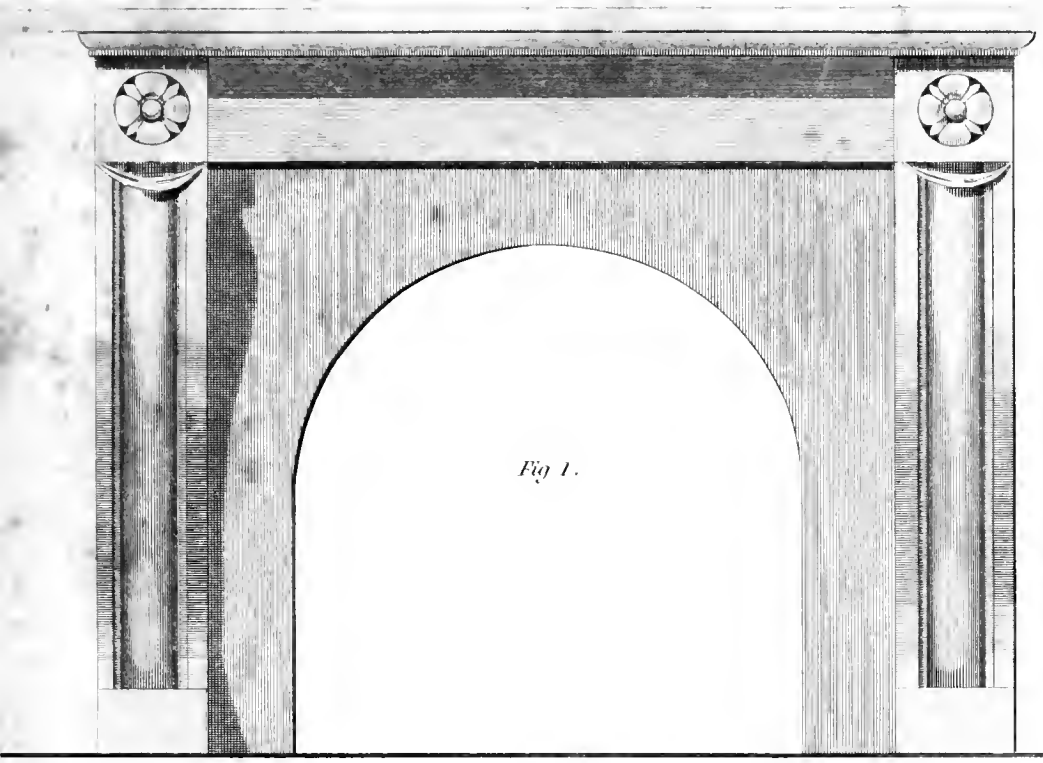


Fig 1.

Fig 3.

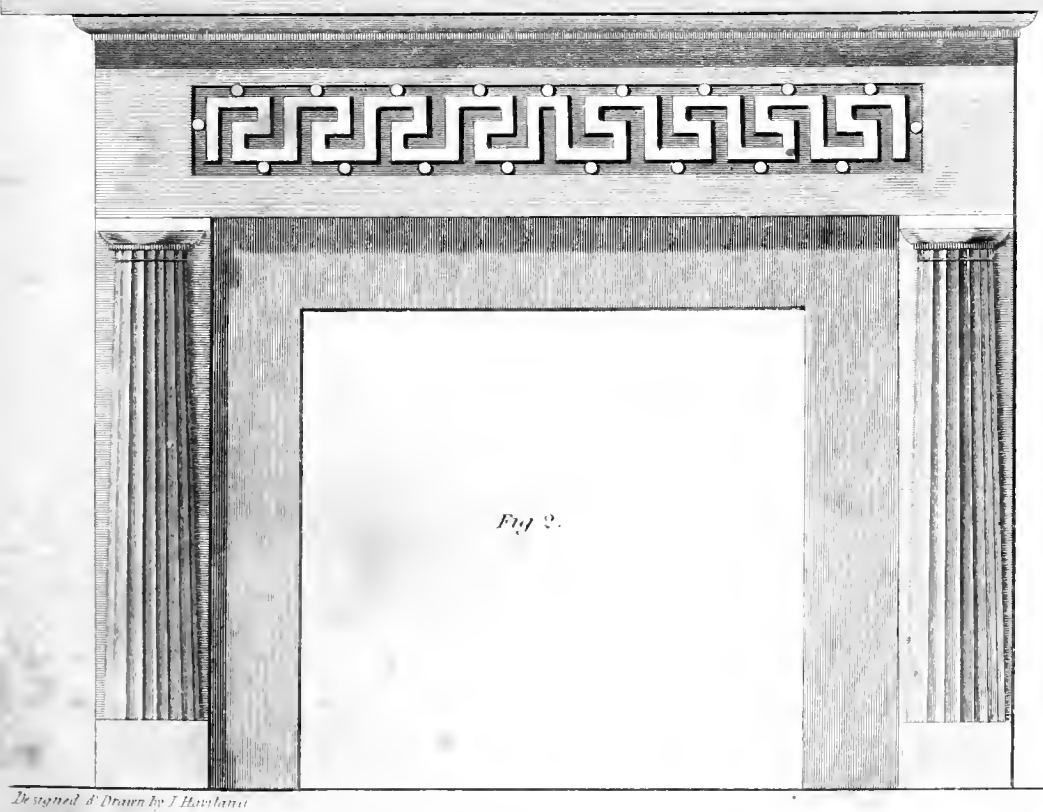


Fig 2.

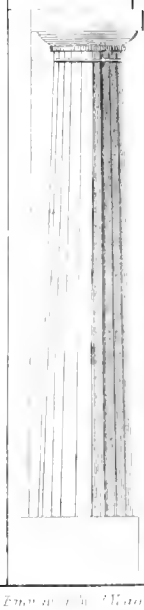


Fig 4

Designed & Drawn by J Haviland *Engraved by W. Wise*

Inches 1 2 Scale. 3 4 *Feet* 5

PLATE 32.

Fig 1.

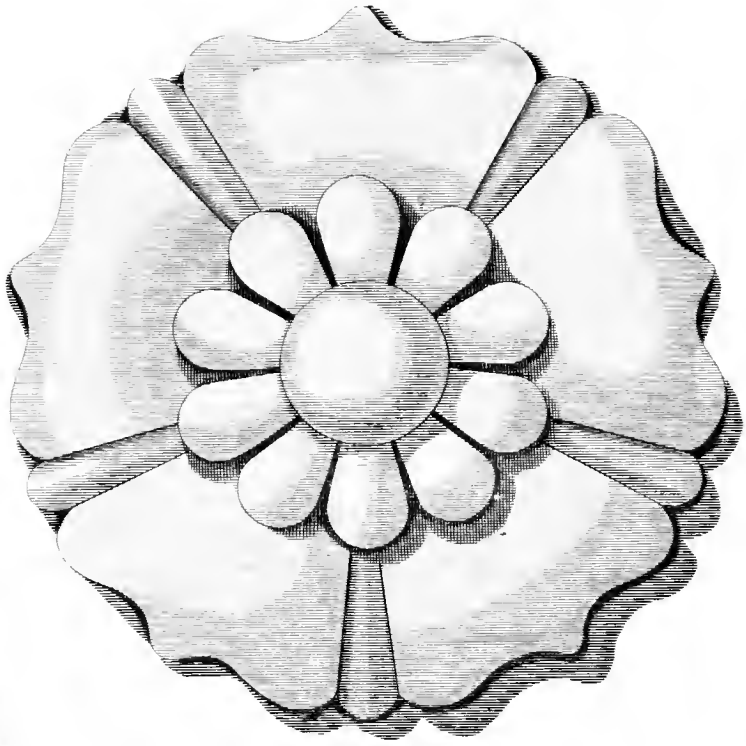


Fig 3.

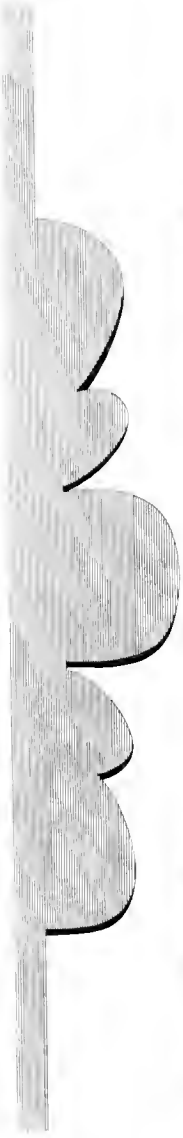


Fig 2.

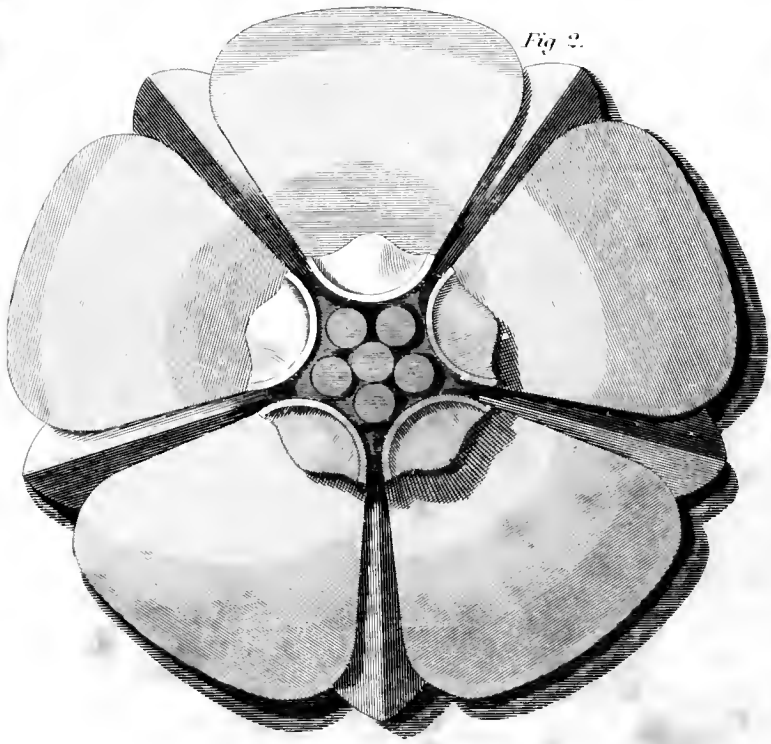
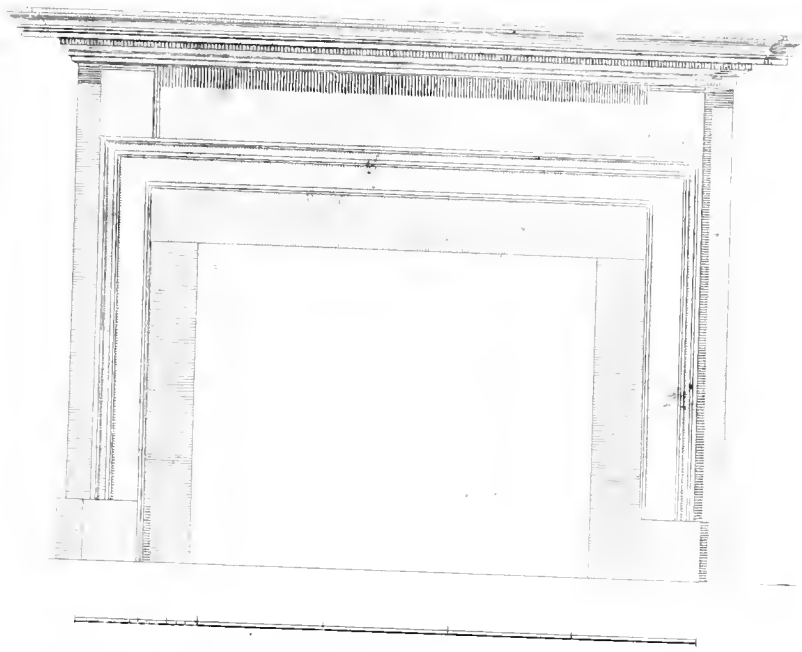
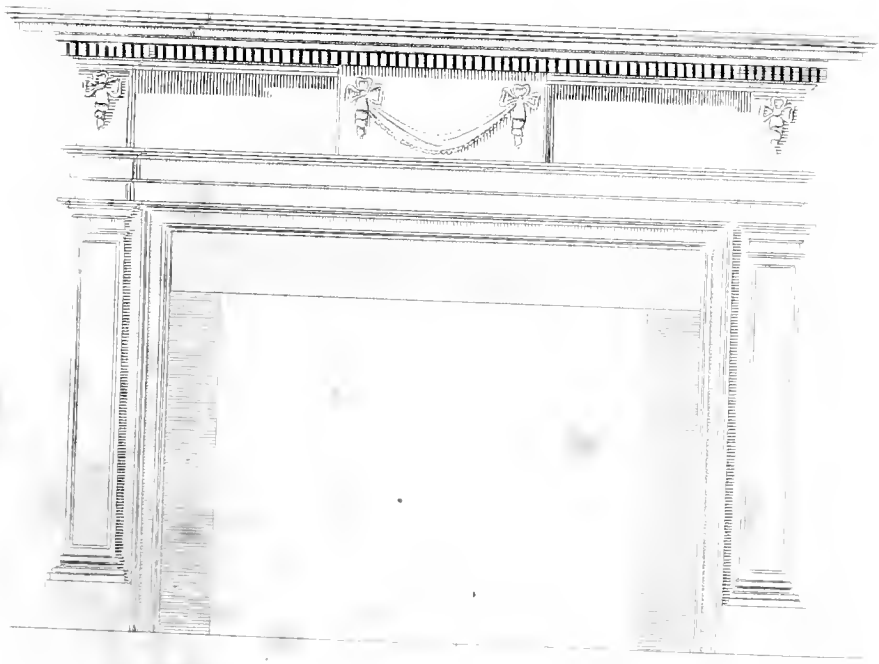


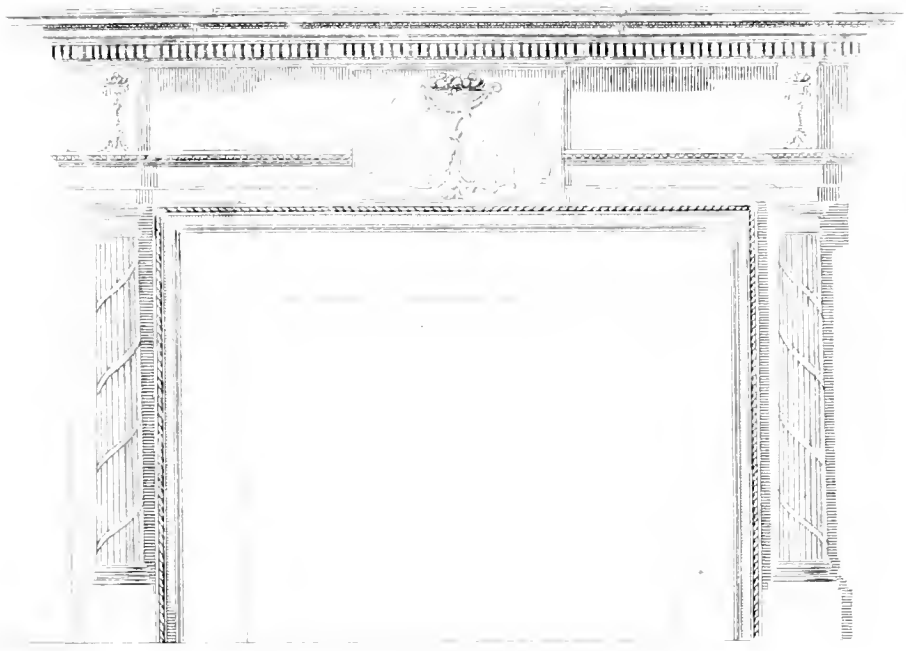
Fig 4.

Designed & Drawn by J Hazeland

Engraved by J Yeager







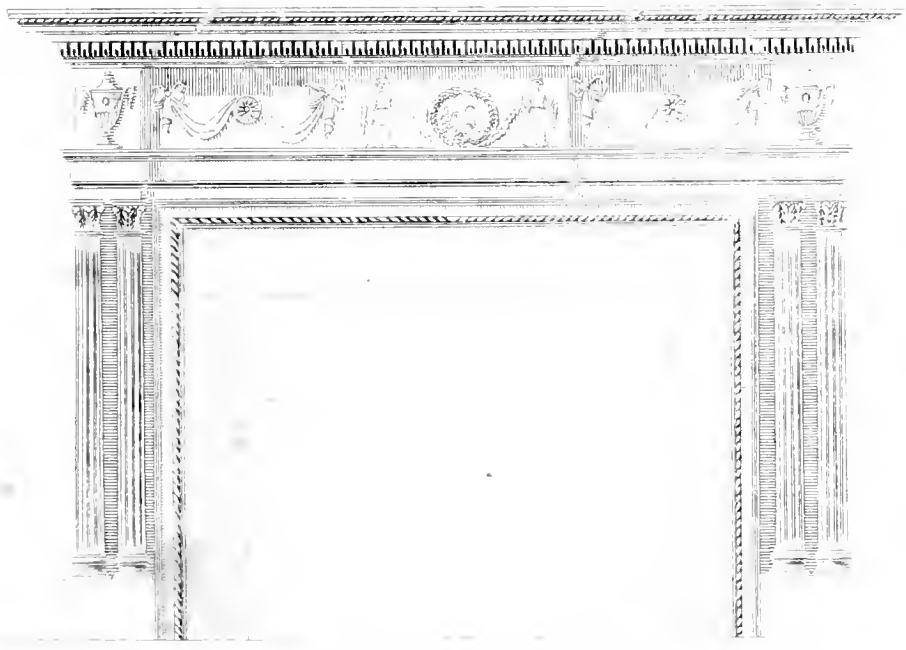
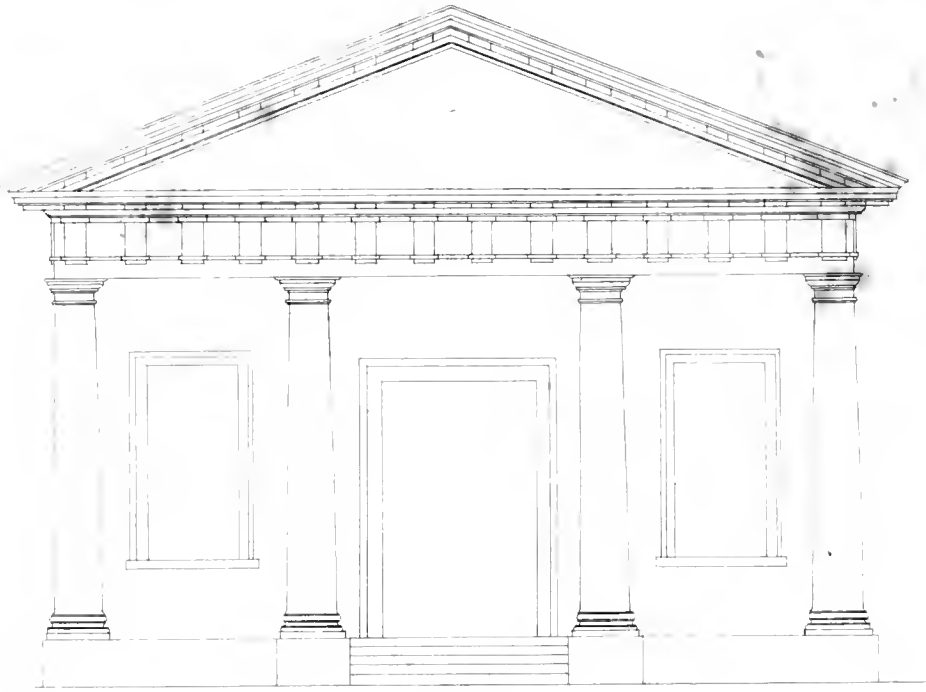


PLATE 35.



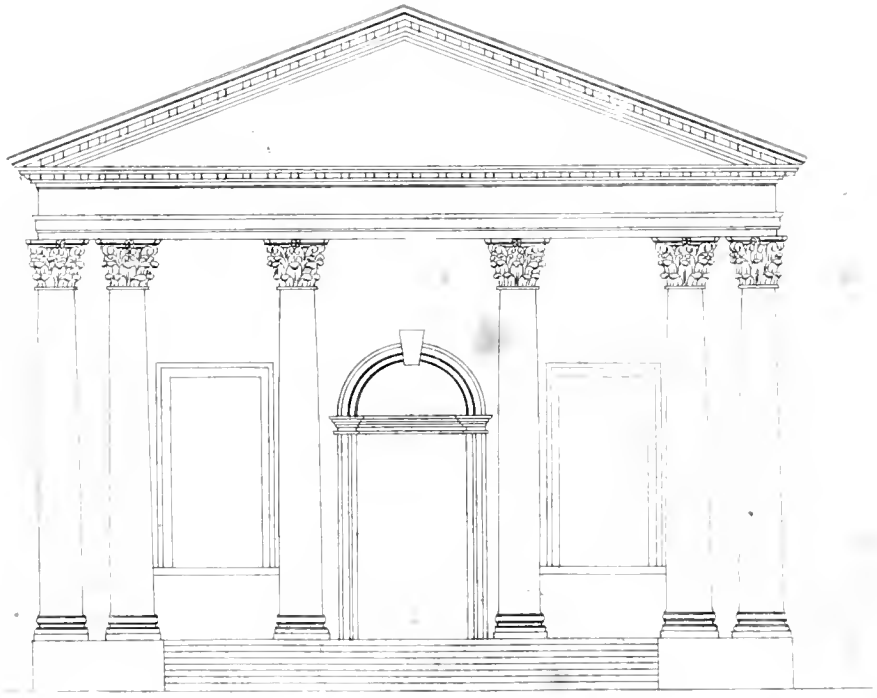
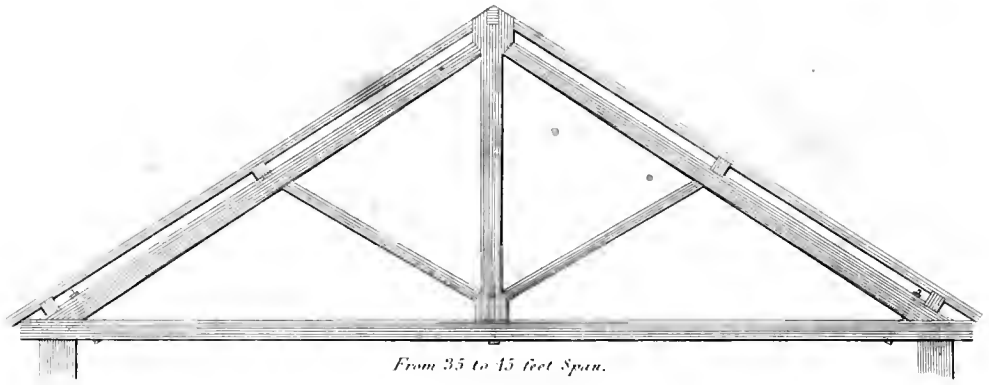
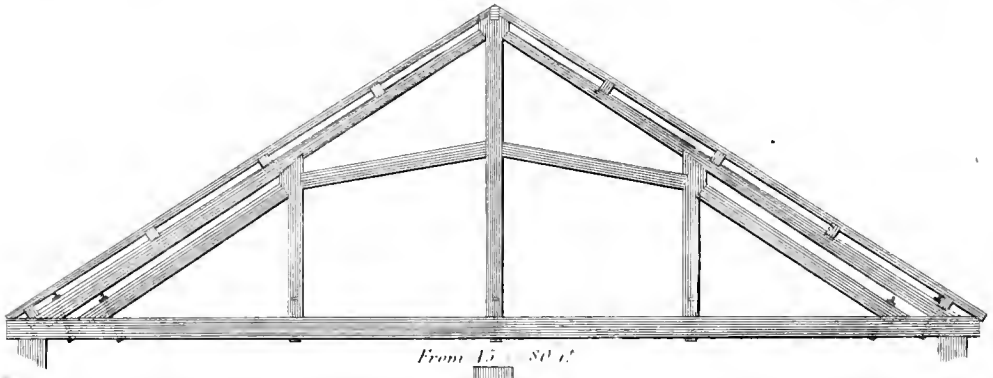


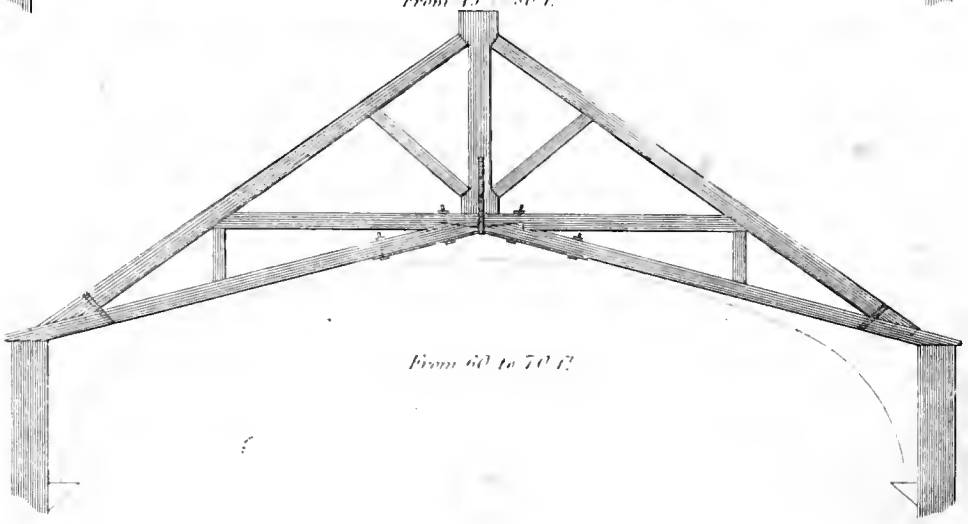
PLATE 36.



From 35 to 45 feet Span.



From 45 to 60 f.



From 60 to 70 f.

PLATE 35.

Of Intercolumniation.

This Plate represents two Porticos; one Doric, and the other Corinthian. It is necessary, in all Orders where there are modillions, that the column should be exactly under a modillion. The Doric Order does not admit of the columns being coupled, as they are in the Corinthian; the space from centre to centre of the modillions or triglyphs being but 75 minutes, when two columns, with the bases touching, would be 80 minutes from centre to centre. The examples in the Plate are both of small Porticos; and, to admit of a convenient space between the columns, the intercolumniation, or space between the columns, is greater than it should be when the Porticos are large, and a graceful appearance is required. To admit of a free passage to the door, the middle columns are placed further apart than the others; though this is sometimes dispensed with, and the spaces made uniform.

PLATE 36.

Of Roofs.

This Plate gives three examples of framing for principal rafters for Roofs. In designing these, the material for the covering should be considered; whether it would require a strong frame and steep pitch, as tile or slate, or whether shingles, or any kind of metal is to be used. Both the strength of framing, and the pitch of the examples, in the Plate, are calculated for shingles.

It is a considerable improvement in framing principal rafters, to keep them below the purlins, and to let the jack-rafters lie on the purlins; the Roof, besides being much stiffer, being easier regulated, or kept straight on the top; and the feet of the rafters are brought so far from the end of the girder as to be much stronger in their footing; the dotted lines, at the foot of the rafter, show the shape of the tenon, which should be about half the thickness of the rafter, and the ends to fit hard in the mortise. A screw-bolt, to go through the girder up into the post, is a better way of supporting the girder than a strap; the nut is let into the post in the same manner that a bedstead screw is.

The customary pitch for Roofs, which are covered with shingles, is, one-third of the span for the height; and to find the length of the rafter, take half the span and square it, and the whole height and square that; add the square of these two together, and from that sum extract the square root, which will be the length of the rafter.

EXAMPLE.

Suppose a Roof to span 45 feet, to rise one-third, or 15 feet.

Half of 45 is 22.5	The height 15
22.5	15
1125	75
450	15
450	
Square of half-span 506.25	Square of the height 225
Square of the height 225.	

731.25(27.0 feet, length of rafter.
4

47)331
329

540)225

PLATE 37.

Of Domes.

A is the section and B is the half-plan of the framing for a Dome to have a vaulted ceiling and an opening for a sky-light. This frame is taken from P. Nicholson, and to me appears to be abundantly too strong. If we consider that the purlins form a number of bands round a roof of this form, which must burst before the roof falls in, we will find that we have little else to do but to connect the ends of the purlins so as to form hoops round the Dome, and it is impossible for the roof to fall in, while the hoops are entire.

PLATE 38.

Dome of boards and plank.

Fig. A is the section of a Dome made with thin boards and small pieces of plank. The principle of this form of roof consists in placing a number of hoops one above the other, and of such sizes as, when properly placed, will form the contour of the Dome. These hoops are here formed by pieces of plank, represented by fig. D at the bottom of the Plate; near each end of this is a pretty long mortise; the position

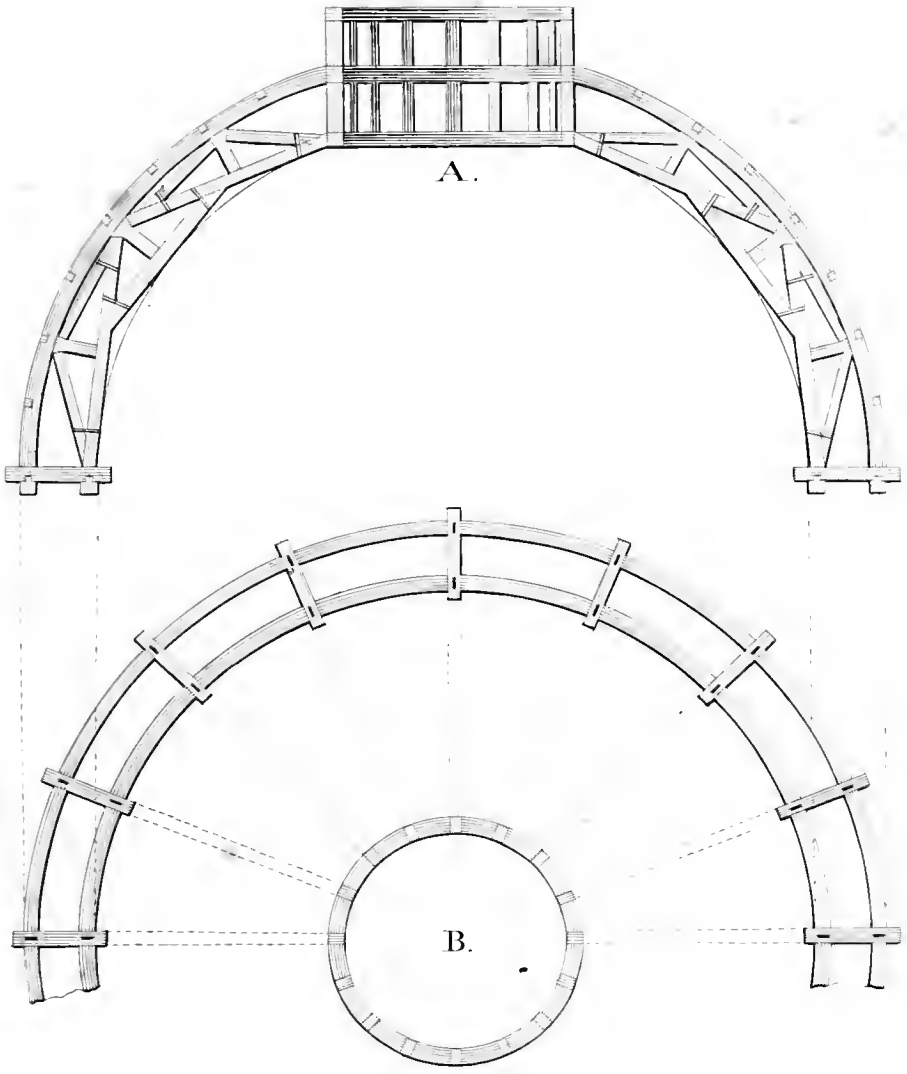
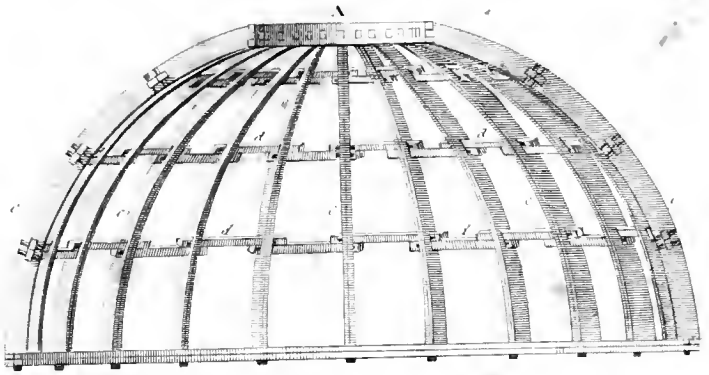
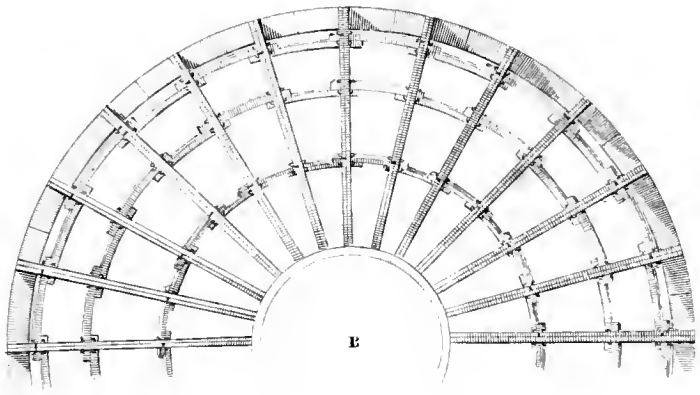

A.
B.

PLATE 38.





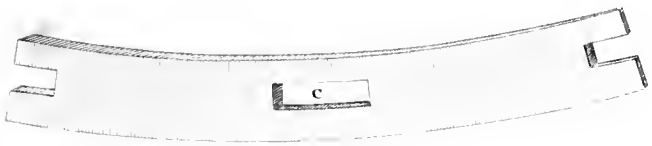


PLATE 39.

Fig. A.

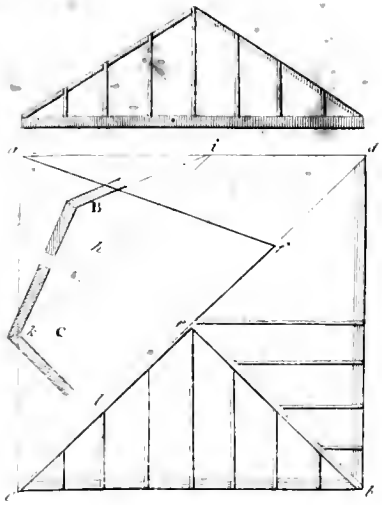


Fig. B.

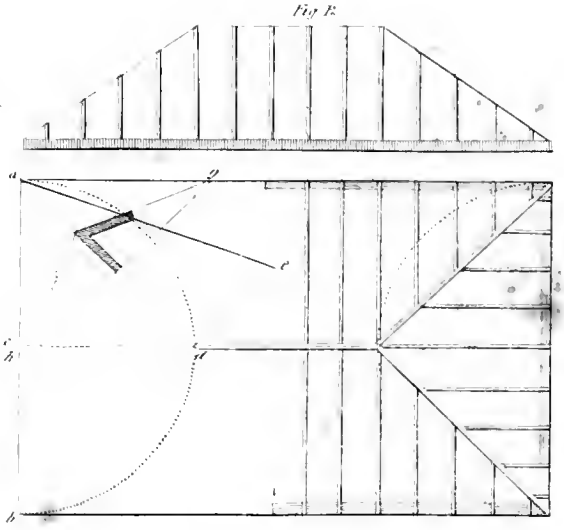


Fig. C.

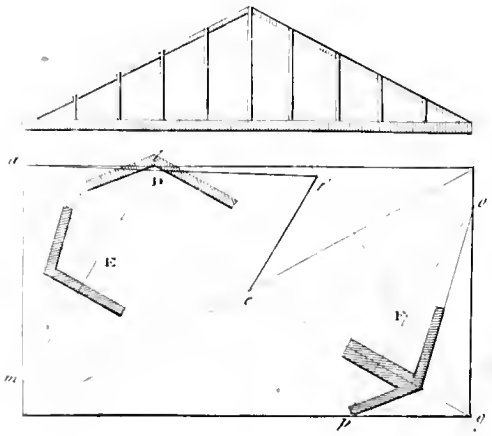


Fig. D.

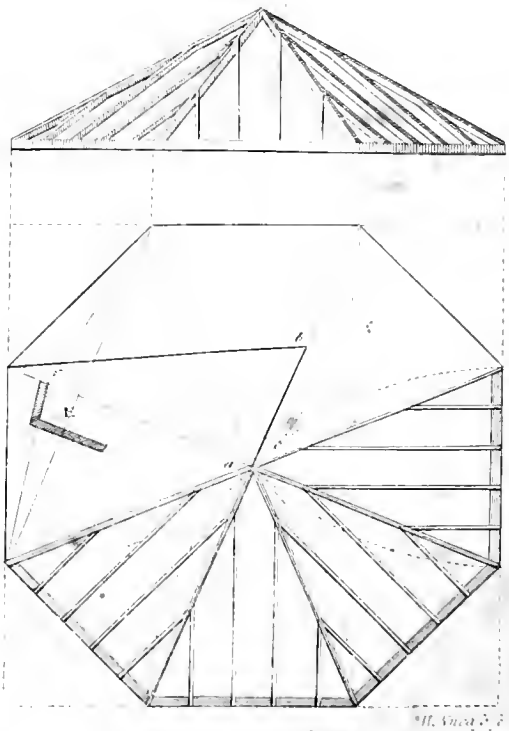
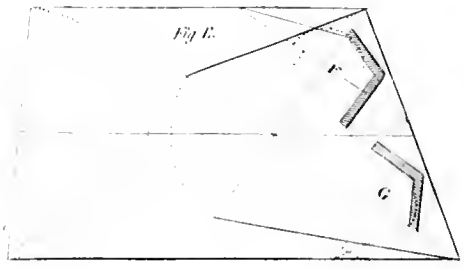


Fig. E.



of these is shown in the section A by *d d d*. Fig. C is one of the ribs or rafters with a mortise in the middle of it long enough to receive two of fig. D, and at each end a sliding mortise of half that length, represented in section A by *c c c*. When these are to be put together, the wall-plate (which should be of two thicknesses of boards, and made to break joint) should be first laid, and then a piece of the rafter, fig. C, should be fixed upright in its proper place and secured by a tenon at the lower end, which must go through the Plate. It should be observed, that the rafters are of two thicknesses, which should break joint; of course, one of the first pieces should be but half the length of fig. C. When one set of the rafters are fixed all round, the pieces, fig. D, which form the hoops, or which I shall call the purlins, are fixed in them, and secured by wooden keys, which are driven, one on each side of the rafter, through the mortise. By driving these keys, more or less, the hoop may be lengthened or contracted, so as to bring it to the exact form or contour of the Dome. After the first set of purlins are fixed and properly keyed, another set of rafters are placed, and then another set of purlins, until the Dome is complete.

The figure in the Plate, for the sake of making its parts more clear, has been drawn considerably out of proportion, the materials being much too large, and a much greater number of purlins would be proper. This principle of covering may be extended to a great span, and when the rafters come too close together, at the top, every other one may be left out.

PLATE 39.

Hip-Roofs.

Fig. A is a square plan, to be covered with a Hip-Roof. To find the length of the hip-rafter, draw the diagonals *a b* and *c d*, which will bisect each other at right angles at *e;* make *e f* equal to the height of the roof, and draw *a f*, which will be the length of the hip-rafter. To find the bevel of the back, draw *i k* at right angles with *a e*, to cut it in any point, as *h*, place one foot of the compasses in *h* and extend the other to the back of the rafter *a f*, and describe a semicircle to cut the base-line *a e* at *g;* then draw *g i* and *g k*, which will be the backing of the hip, as is shown by the level at B. But the best way of working it is by the side-bevel at C, which is made by drawing *l k* parallel to *a e*.

Fig. B is an oblong rectangular plan, to be covered with a ridge in the middle. Make *c d* on the ridge equal to half the width *a b*, and draw *a d;* at right angles to which make *d e* equal to the height of the roof, and draw *a e*, which will be the length of the hip-rafters. As these may also answer for sky-lights, and the hip-rafters of those are sometimes mitred together, the bevel for the mitre is here given.

Fig. C is the same plan as the foregoing, to be covered without any ridge. Draw two diagonal lines to cross each other in the centre at *c;* draw *c f* equal to the height of the Roof and at right angles with *a c*, and draw *a f* the hip-rafter. To find the backing, draw *m b* at right angles with *a c*, and proceed as in the former cases, when the two bevels D and E will be found by making their stocks parallel to

the base-line *a c*. At F is given the bevel for mitring hips for sky-lights, found by drawing *o p* at right lines with the diagonal or base-line.

Fig. D is an octangular plan. The hips are found in the same manner as the preceding. By making the height *a b* at right angles to one of the base-lines, the bevel is shown at E.

Fig. E is the plan whose sides are parallel, but the ends out of square. To find the hips, on each end, as a diameter, draw a semicircle, and from the two centres draw the ridge; where the semicircles cross this, will be the points to draw the base-lines for the hips. The bevels F and G are found as before directed.

PLATE 40.

Centres for Arches.

In making centres, the manner in which the framing is strained should be well understood, as frequently a piece of timber which is intended to form a tie, and framed to answer the end of one, will, by an alteration of the pressure on the centre, in turning the arch, become a strut; and so vice versa, a strut become a tie; and joints, which it was expected would be pressed hard, have become open, and required strapping to secure them.

Fig. A will explain a simple trussing for a centre. It is always expected that the abutments for the arch are sufficient for the centre; and that a tie beam across the bottom is useless. Supposing the footing *a* and *b* are secure, any two pieces of timber, as *a c* and *c b*, connected at *c* like rafters, and footing at *a* and *b*, will bear any pressure at *c*, both acting as struts; and, unless they bend, the centre will not vary its shape at the point *c*. The same may be said of *a d* and *d b*, and also of *a e* and *e b*.

It is on this principle the centre, fig. B, is drawn, *a* and *b* being the abutments, and *c d* and *c* corresponding with the same letters in fig. A, the pieces *f g h* and *i* are both ties and struts; and the joining of *k* and *l* into *h* should be made like the footing of rafters, as *h* is a tie for them while it forms a strut in a line with *m* and *n* to bear the pressure on the centre at *c*. In this frame the scantling is all short. If timber could be procured long enough to reach the length of the three pieces *m h* and *n*, it would be better to make it in one piece, and halve all the joints; the posts *o p* and *q* might then be in two thicknesses, and notched out to receive the frame between them. *r* and *s* are the striking-wedges by which the centre is lowered, after the arch is turned; *t* and *u* the blocking by which it is supported.

It is of considerable importance, in making centres for large arches, that the principle of equilibration or balancing of arches should be understood. By this is meant, that the line of the arch should be of such a curve, as to have no tendency in any part either to rise or fall. This curve is found by taking a chain of equal weight throughout, and suspending it from two points placed as far apart as the arch is to span, and allowed to sag till it touches a third point, placed equidistant from the others, and so far from a right line connecting them as the arch is to rise; the chain

PLATE 40.

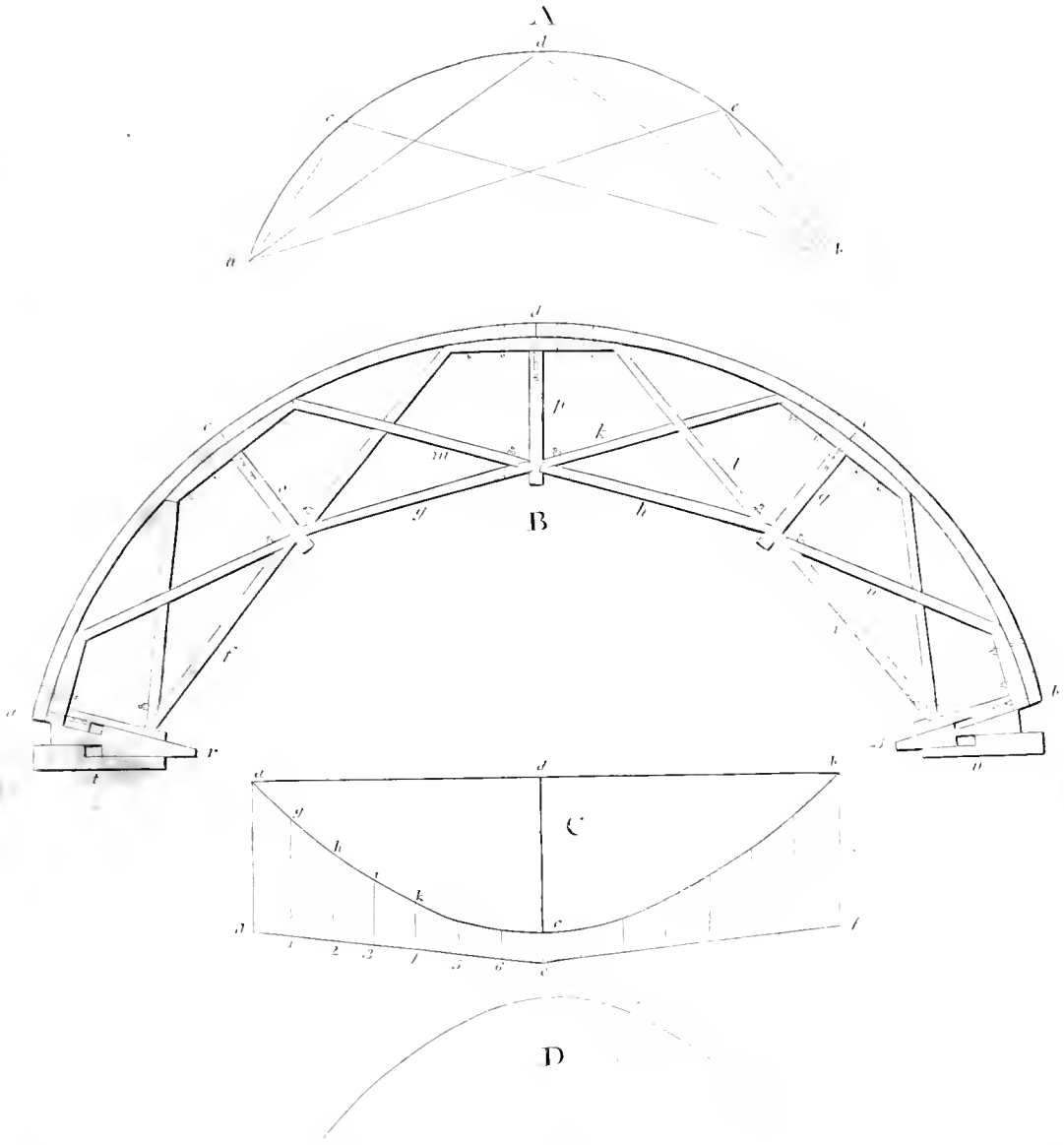


PLATE II.

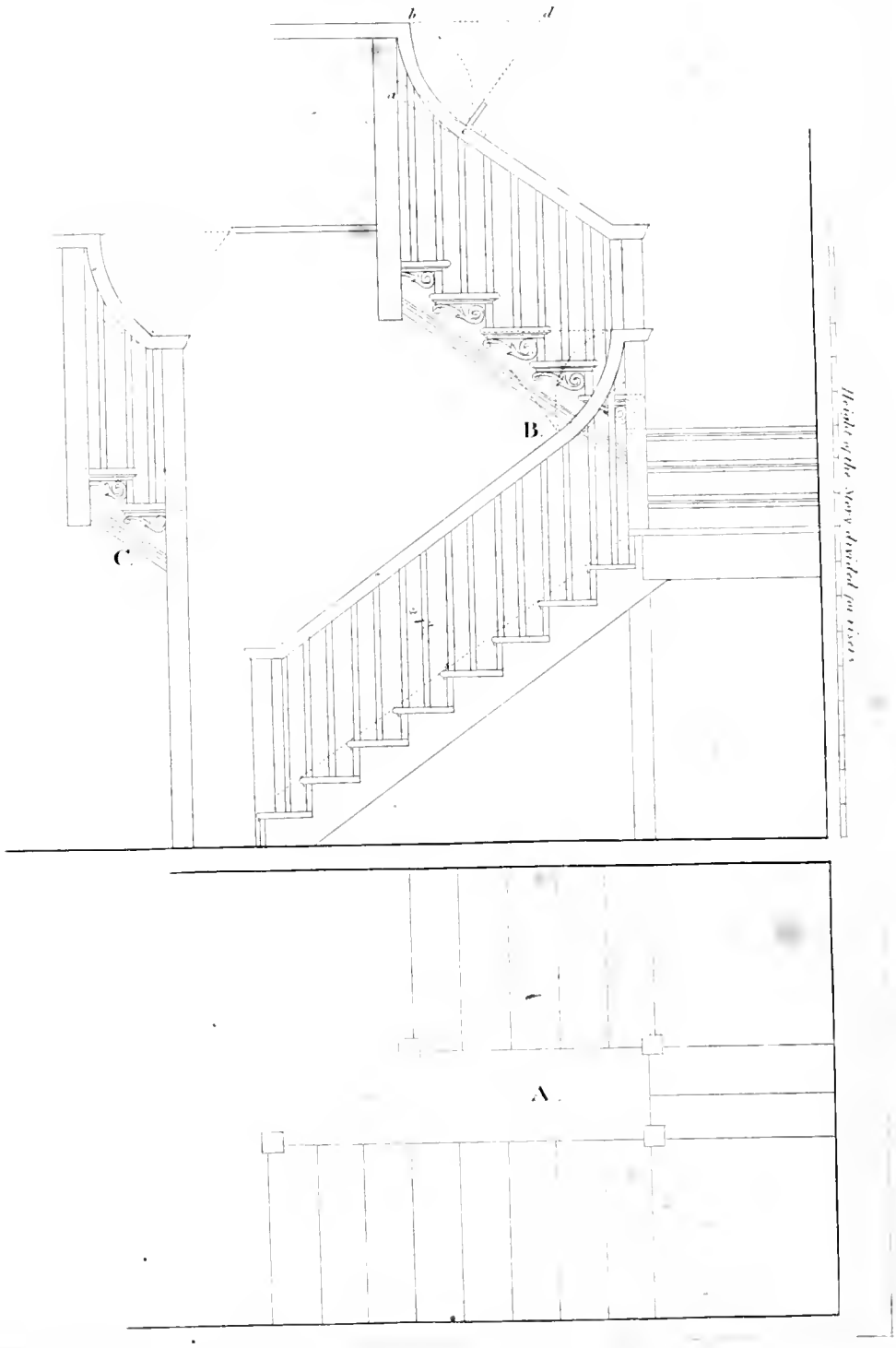
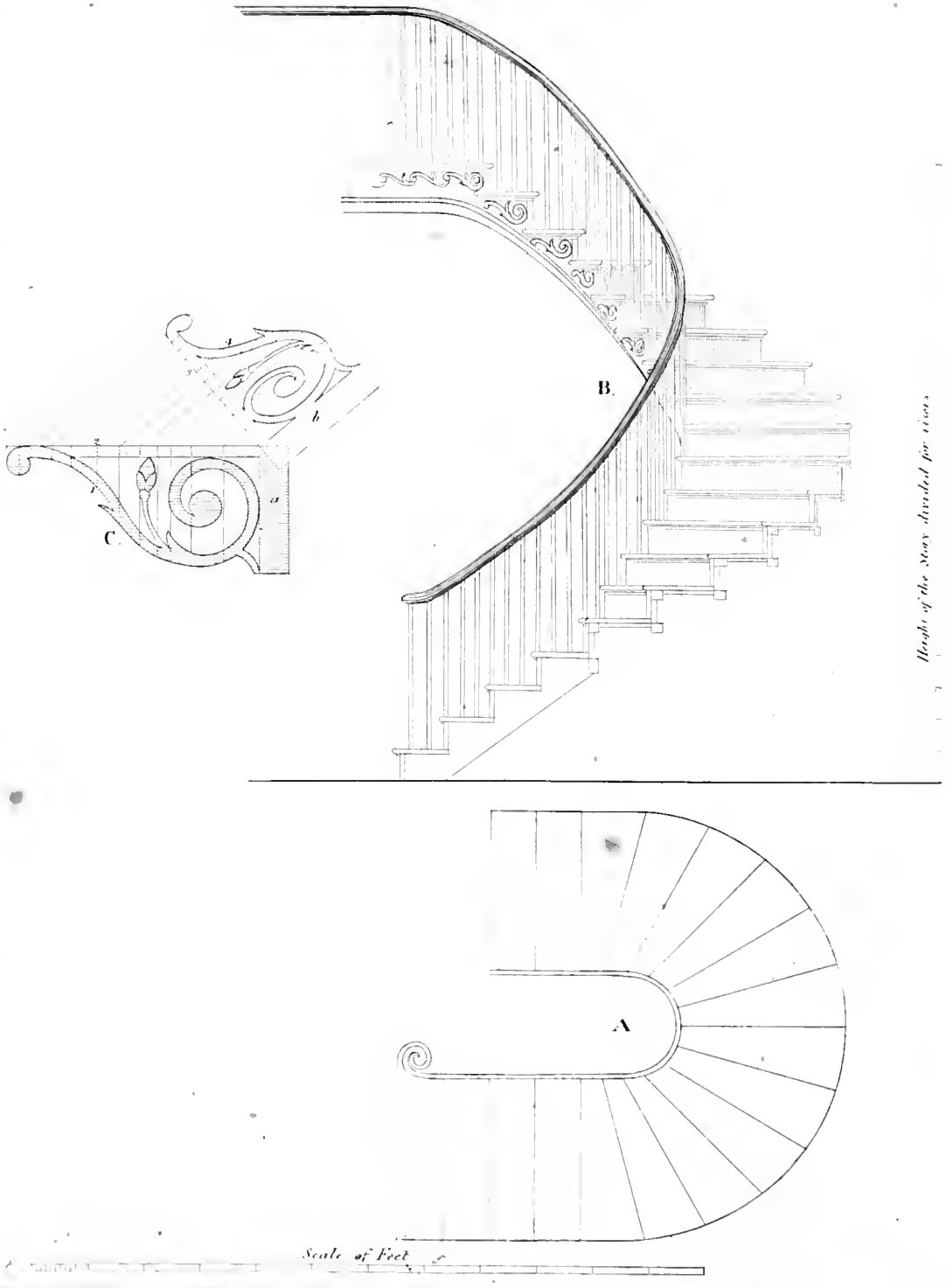


PLATE 42.



Height of the Story divided for risers

will then describe the true curve of an arch, which, supposing the materials to be all equal in weight, will have no tendency to rise or fall in one part more than in another. This is called the *Catenarian Curve*, and is represented by fig. C, *a* and *b* being the points of suspension of the chain and the span of the arch, and *c d* the rise of the arch. It frequently happens that the arch is loaded more in one part than another, as in a bridge filling up over the haunches to level the road. To counterbalance this, and preserve the equilibration of the arch, draw a section of the filling up, but with the drawing turned with the upper edge downwards, as *d e f*, fig. C; divide along this any number of equal parts, as at 1, 2, 3, &c., and suspend to the chain *a c b* pieces of chain, of the same make from the points *g h i k*, &c., so as they may fall over the divisions 1 2 3, &c. These chains being cut so as to just reach the line of the road, *d c f*, will represent the filling in over the haunches, and will make the chain *a c b* the form of an arch that will be equally balanced.

In fig. D, I have given a curve which will be pretty near the Catenarian; but drawn from centres with compasses. *a* is the centre of the small part at top, and *b* and *c* the centres of the other parts.

PLATE 41.

Of Stairs.

Fig. A is the plan of an open Newel Stairs, with two quarter-paces; and B is an elevation of the same; C being that part which is between the two quarter-paces.

To draw the Ramp of the Rail.

When a section of the steps is drawn, place the newel posts in their places, making them fair with the front edge of the steps, and draw the hand-rail, making it 2 feet from the top of the steps to the top of the rail. Lay off the balusters, and let the mitre or key of the rail come on the first baluster. This gives the height of the first newel post. Make the other posts all the same height; continue the line of the bottom of the rail up till it strikes the edge of the newel post at *a*, fig. B; place one foot of the compasses on *a*, as a centre, and extend the other to *b* at the top of the rail on the post, and draw the arc *b c;* then draw *c d* square with the top of the rail till it meets the level of the rail on the post continued, as *b d;* then will *d* be the centre for sweeping the Ramp.

PLATE 42.

A is the plan, and B the section or elevation, of a circular or geometrical Stairs. In drawing the plan, I have made the circular steps to come beyond the centre of the circular part the width of one square step. By that means the

ends of the circular steps are made wider, and the difference in the rake of the hand-rail, between the square and circular steps, is not so great as it otherwise would be.

Fig. C shows the manner of drawing a bracket, for the ends of the circular steps, which shall correspond with one made for a square step. C is the square-step bracket. Draw any number of parallel lines across this, as 1 2, and those parallel to it; then, from the point *c*, draw *c d* at any angle, and equal in length to the circular bracket; draw ordinates from the lines in C, as 2 3, and those parallel to it, touching the line *c d;* continue those lines at right angles with *c d*, as 3 4, and those parallel to it; take the distance of the ordinates, from the line *c c* to the edges of the bracket C, and mark them on the corresponding line in the short bracket, from the line *d e*, and through those points trace the form of the circular bracket.

PLATE 43.

To draw the scroll for a Hand-rail.

Make a circle three inches and a half in diameter, as *a b c d*, fig. A; within this make a square, equal to one-third the diameter of the circle, as *e f g h;* divide this into 36 small squares, as is represented in fig. B on its full size, and laid in the same position as in A, and with the centres numbered by which the scroll is drawn; place one foot of the compasses on 1 in the square, and extend them to *c*, and draw round to 1 on the edge of the Rail; then set the compasses in 2 in the square, and extending them to 1 draw round to 2 on the edge, and so on till the whole is drawn round to 6. To draw the outside of the Rail, set in its thickness from 6 to 12, and go back by the same numbers, and the scroll will be complete.

To draw the Curtail-step.

At *i k*, in fig. A, place the thickness of a baluster, and set out to *l* the projection of the nosing; with the same centres, used for drawing the scroll, draw this round till it meets the nosing at the end of the step, drawn with the same projection. The thickness of the balusters, being set off, may be drawn round in the scroll, and they may be spaced off, making them the same distance apart that the other balusters are.

To draw the Face-mould.

Draw the pitch-board *i k l*, fig. A, making the base *k l* cut the scroll as near its centre or widest part as possible. Draw ordinates or parallel lines, as *m n*, *o p*, *q r*, &c. across the scroll; draw the line *i l*, in fig. C, and make the spaces *l w x y*, &c. in fig. C, agree with the spaces *l w x y*, &c. on the line *l i*, in fig. A; draw lines through those points, in fig. C, at right angles with *i l*, as *m n o p*, &c. Take the distances from the line *k l* to the edge of the scroll at A, and transfer them to C, as *m n*, *o p*, &c. taking to the edge of the rail, both inside and outside. Through these points the Face-mould C may be traced with a steady hand; continue the line of the

PLATE 43.

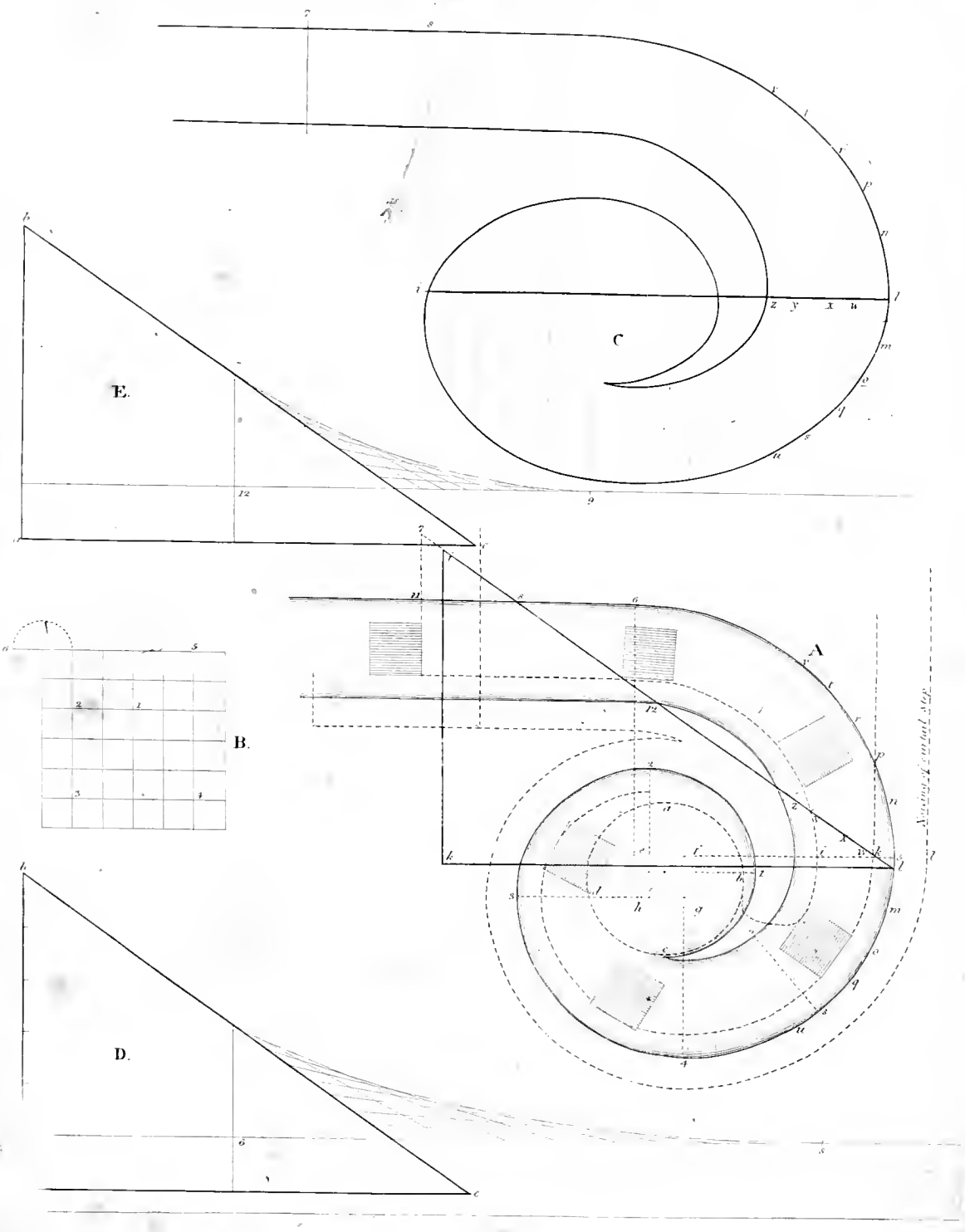


PLATE 44.

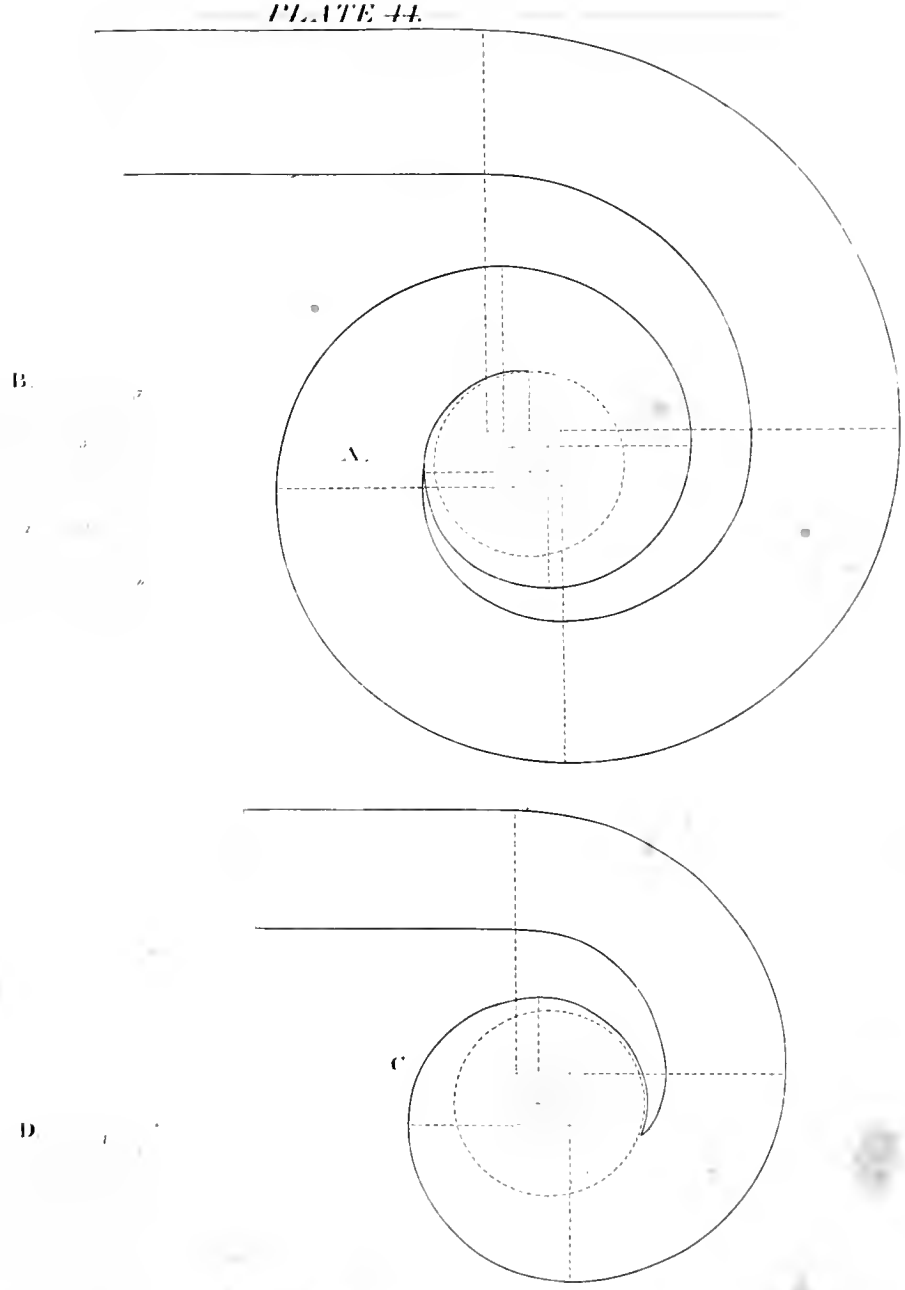
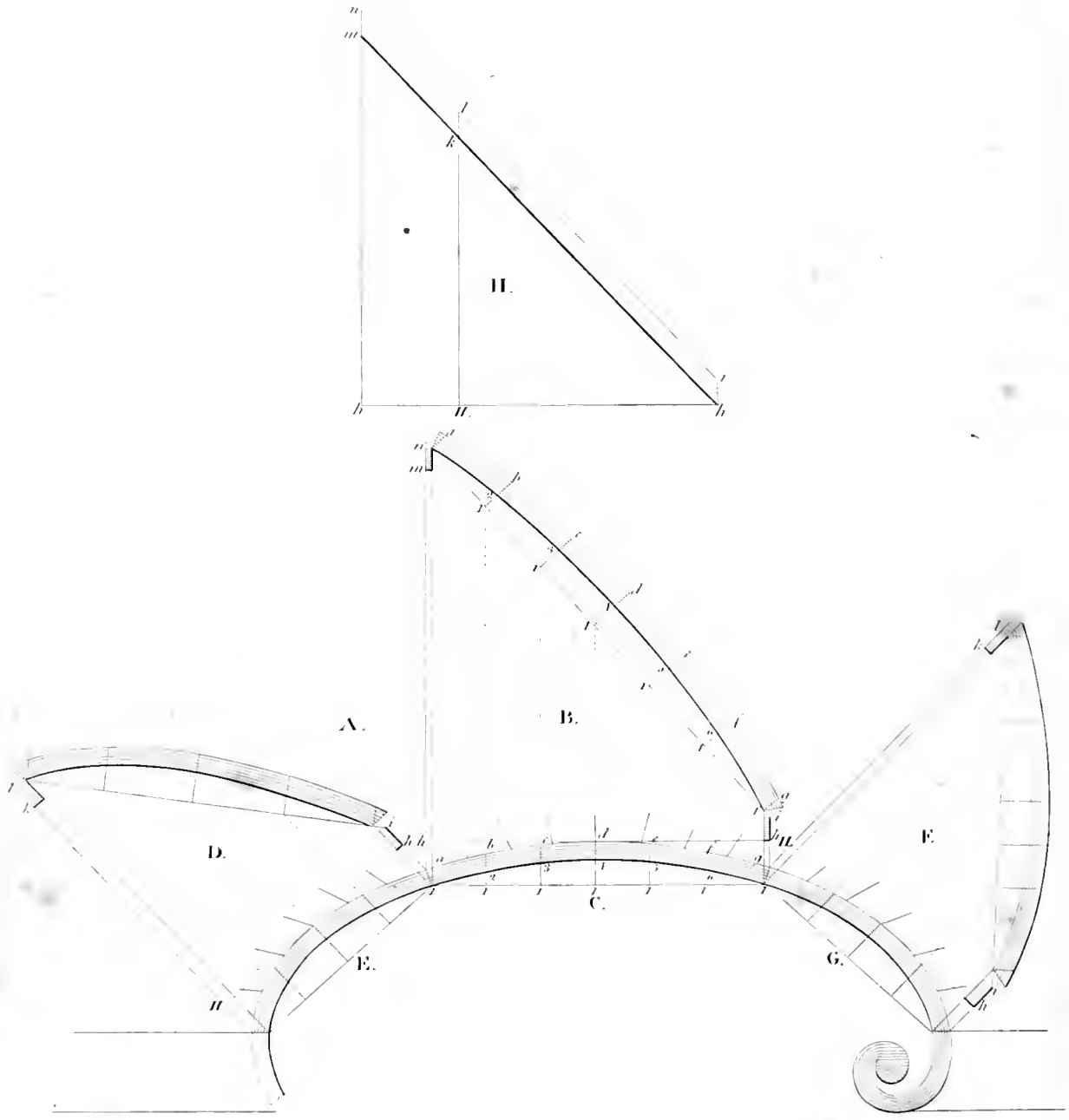


PLATE 45



pitch-board in A up till it strikes the riser of the second step, as from 8 to 7, and set that space off at C from 8 to 7; at which place square over a strong mark, the use of which will be explained hereafter.

To draw the Falling-mould.

Draw the pitch-board at D; take off one-sixth from the bottom, and draw the line 11 6 *s;* take the distance from 11 to 6 in A, and set it from 11 to 6 in D; make the distance from 6 to *s* in D equal to the distances round the rail from 6 to *s* in A (being any distance beyond the first quarter) by tracing round with a small space in the compasses; divide the rake of the rail on the pitch-board, and the level of it out to *s*, into any equal number of parts; and, by drawing intersecting lines, the top of the rail is given.

The Falling-mould for the outside is drawn in the same manner; excepting the distance from 12 to 9 is taken from the outside of the rail from 12 to 9, fig. A.

In applying these to use, the mark at 7 on C should be made to correspond with the edge *a b* of the pitch-board in the Falling-moulds D and E.

PLATE 44.

In this Plate are given two more examples of scrolls of different sizes; B and D contain the centres for drawing, both figured. It may be well here to observe, that, in drawing the scroll, a line should be drawn from the centre about to be used through the one used last, out to the edge of the scroll. This shows where to commence the sweep for that quarter. The dotted lines in A and C will make this clearer.

PLATE 45.

To draw the Moulds for an Elliptical Stair.

The plan of the rail being drawn, and the ends of the steps being all of equal width on the rail, it should be divided round into as many equal parts as there are steps; then take the tread of any number of steps, suppose 8, and let *h h* fig. H be the tread of 8 steps; on the perpendicular *h m* set up the height of 8 risers, and draw the line *m h* which will be the under edge of the falling Mould. The Student will observe, that this falling Mould will be a straight line, excepting a little turn at the landing. Next mark the plan of the rail into as many parts as there are to be pieces in the rail (in this there are three), then draw a chord-line to the joints, as at E C and G; also draw lines parallel to the chords to touch the convex sides of the rail, as *h h;* from every joint draw perpendiculars to their respective chords. Now, the tread of the middle piece at C being just 8 steps, and the section H being for the

same number, set up *h m n* in B equal to *h m n* in H, and make *i h* in B equal in height to *i h* in H; then draw *n i* and draw the ordinates 1 *a*, 1 2 *b*, 1 3 *c*, &c. continued till they touch the line *n i*; prick off the ordinates on the face-mould from the plan C agreeably to the figuring, and trace the Mould through those points, and it will be complete.

The Moulds for D, and F, being only for 6 steps each, the tread of 6 steps should be set off from *h* to H in fig. H, and the height H *k l* set up from the chord-lines at D and F. As for the rest, it is the same as B.

PLATE 46.

To draw the Moulds for glueing Hand-rails in Veneers.

Draw a plan of the rail, as A, on which mark the steps. The twisted part of the rail, which is to be veneered, should reach over one of the square steps, both at top and bottom; make *a b* in fig. B equal to stretch out of the outside or greatest circle in fig. A, and *a c* equal to the height of the rises; again, *d e* is the compass of the lesser circle, set in the middle between *a* and *b*; and *d f* is the height of the steps the same as before; therefore the triangle *a b c* is the pitch-board for the inside falling Mould, and *b m o* at bottom and *i h c* at top are the pitch-boards of two common steps; which lines, when intersected, will give the under line of the inside falling Mould. In the same manner *d f e*, with the two common steps *k g f* at the top and *e l n* at the bottom, will give the under line of the outside falling Mould. The top lines are only drawn parallel of the under side to the thickness of the rail.

In applying them to practice, draw a line *t p* to touch the Mould in two places. This will represent the edge of the plank. Next square over several lines, as *p q*, where the Moulds intersect, and at *t s r*, square over on the plank-lines corresponding with these, and mark off from the edge of the plank the distances *p q* and *t s* on one side, and *t r* on the other; make the Moulds agree with these points, each one on its proper side, and mark off the rail. The plank, being of a sufficient thickness to allow for the saw-curfs, will, when cut out, and twisted, become square, and of the proper size.

PLATE 47.

In this Plate is shown the manner of drawing the section of an eave. After the form of the cornice is fixed on, a section of it should be drawn, either by a proper scale, or to its full size, and then the joist should be drawn with its lower edge on the plancre. From the top of the cornice draw the pitch of the roof, and from that set down the lath, rafters, &c. and it will show the proper place for the raising-piece.

PLATE 46.

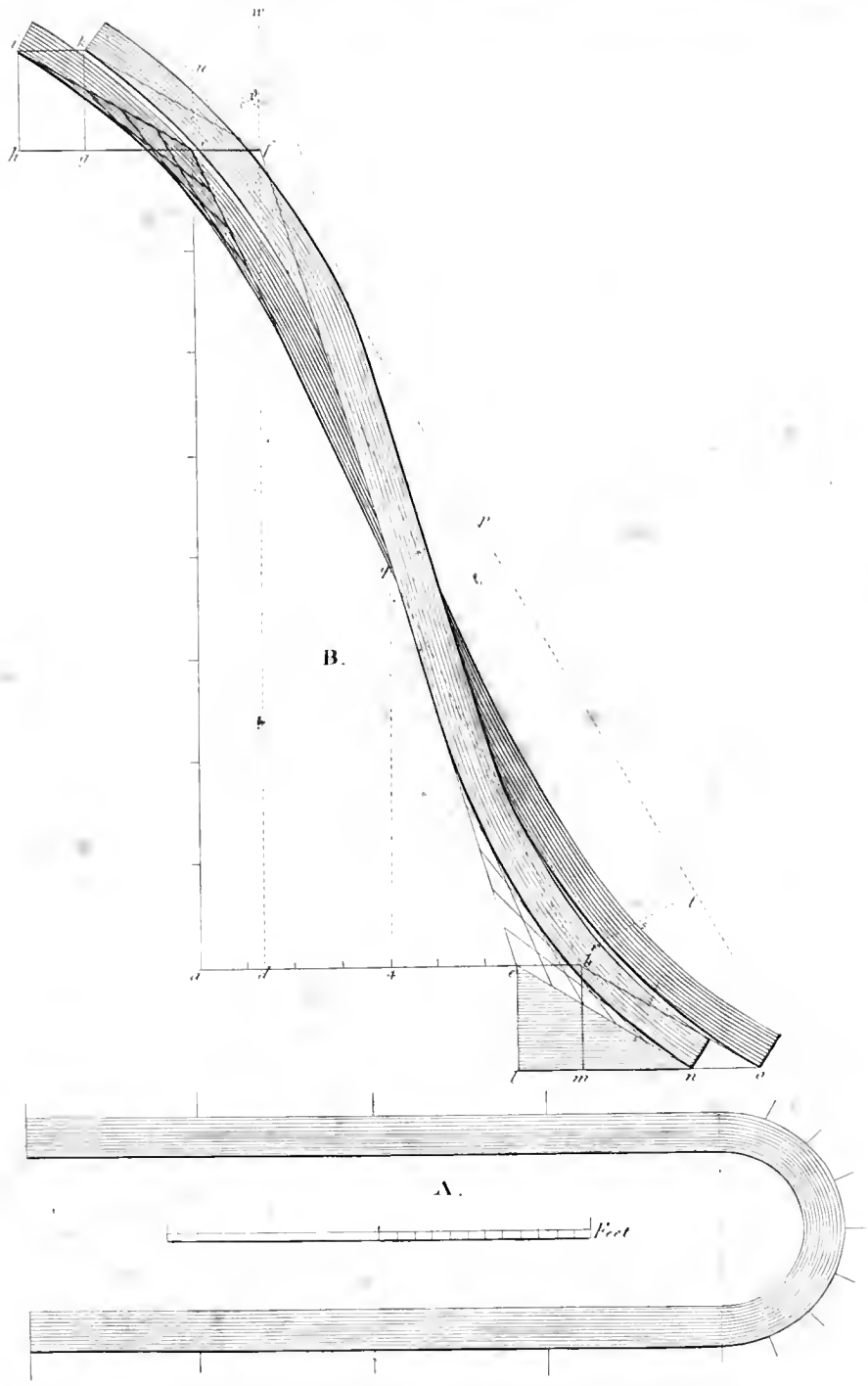


PLATE 17.

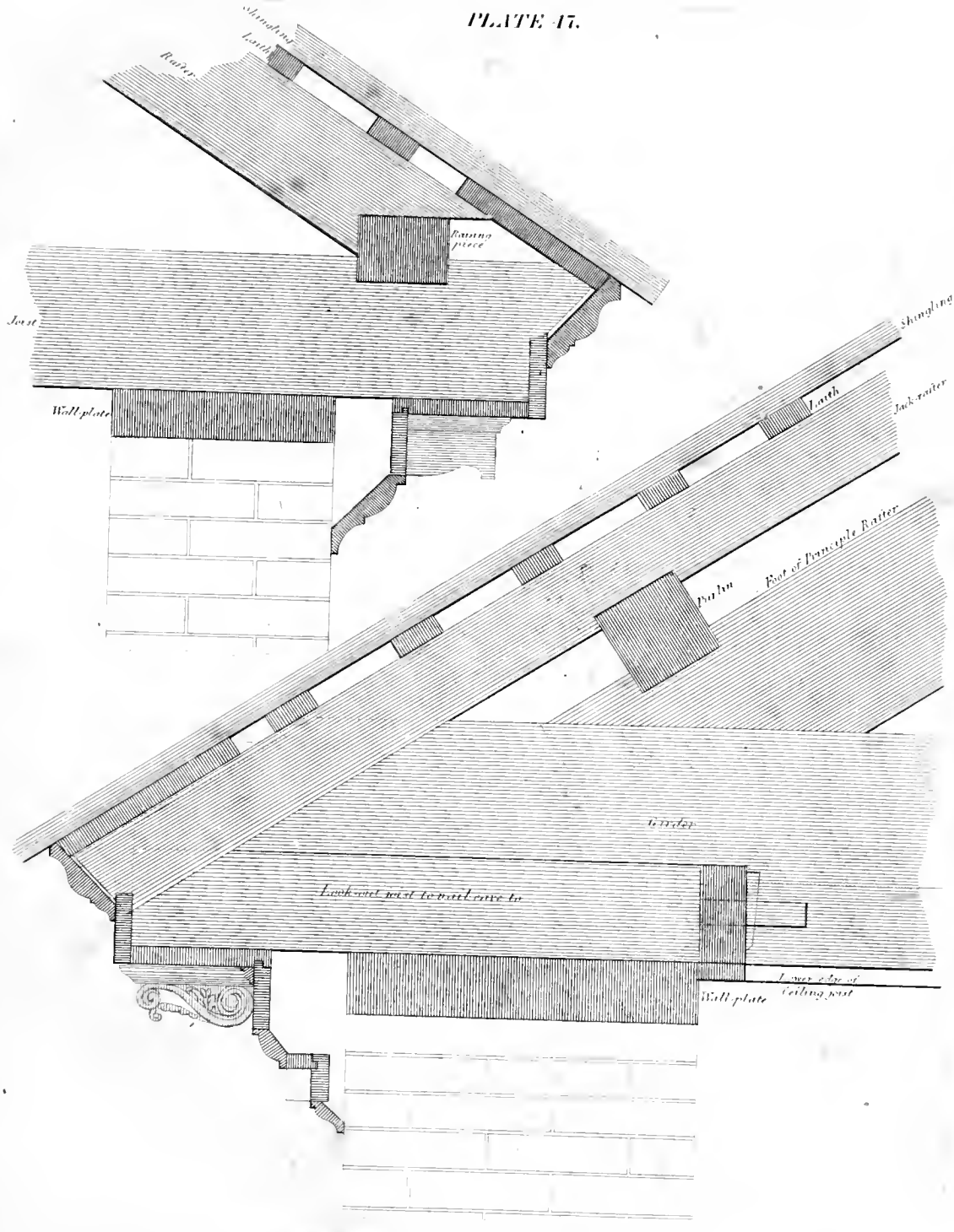
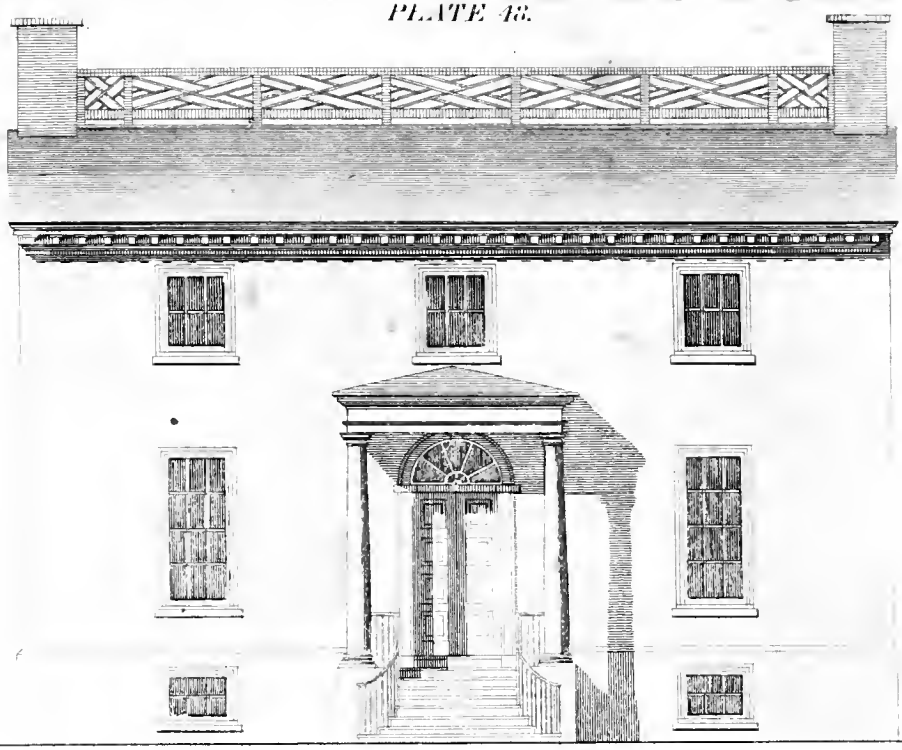

Sheathing
Lath
Rafter
Raising piece
Joist
Wall plate
Sheathing
Lath
Jack-rafter
Purlin
Foot of Principle Rafter
Girder
Lock-out next to wall cove to
Lower edge of Ceiling joist
Wall plate

PLATE 43.



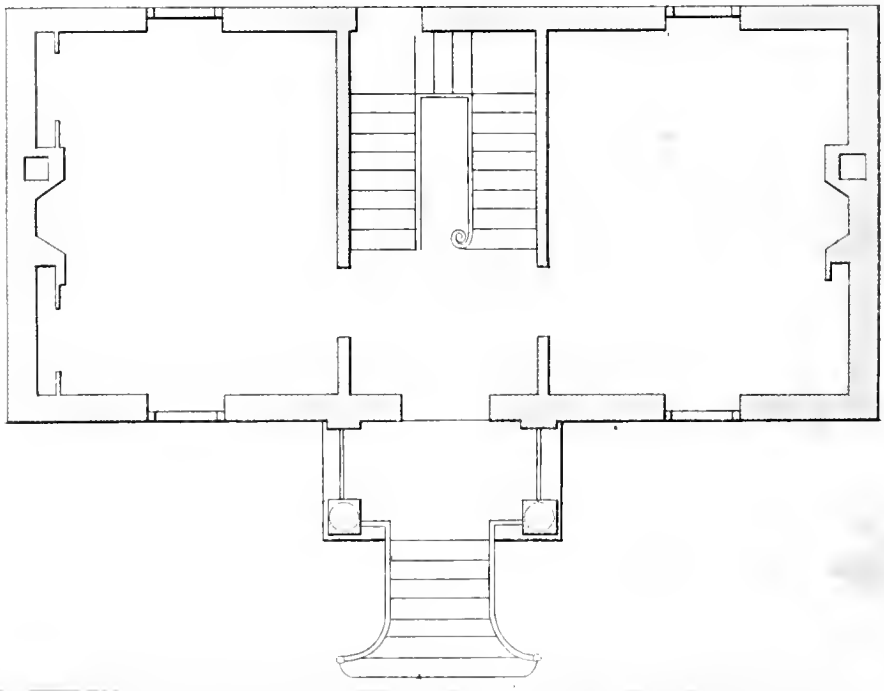
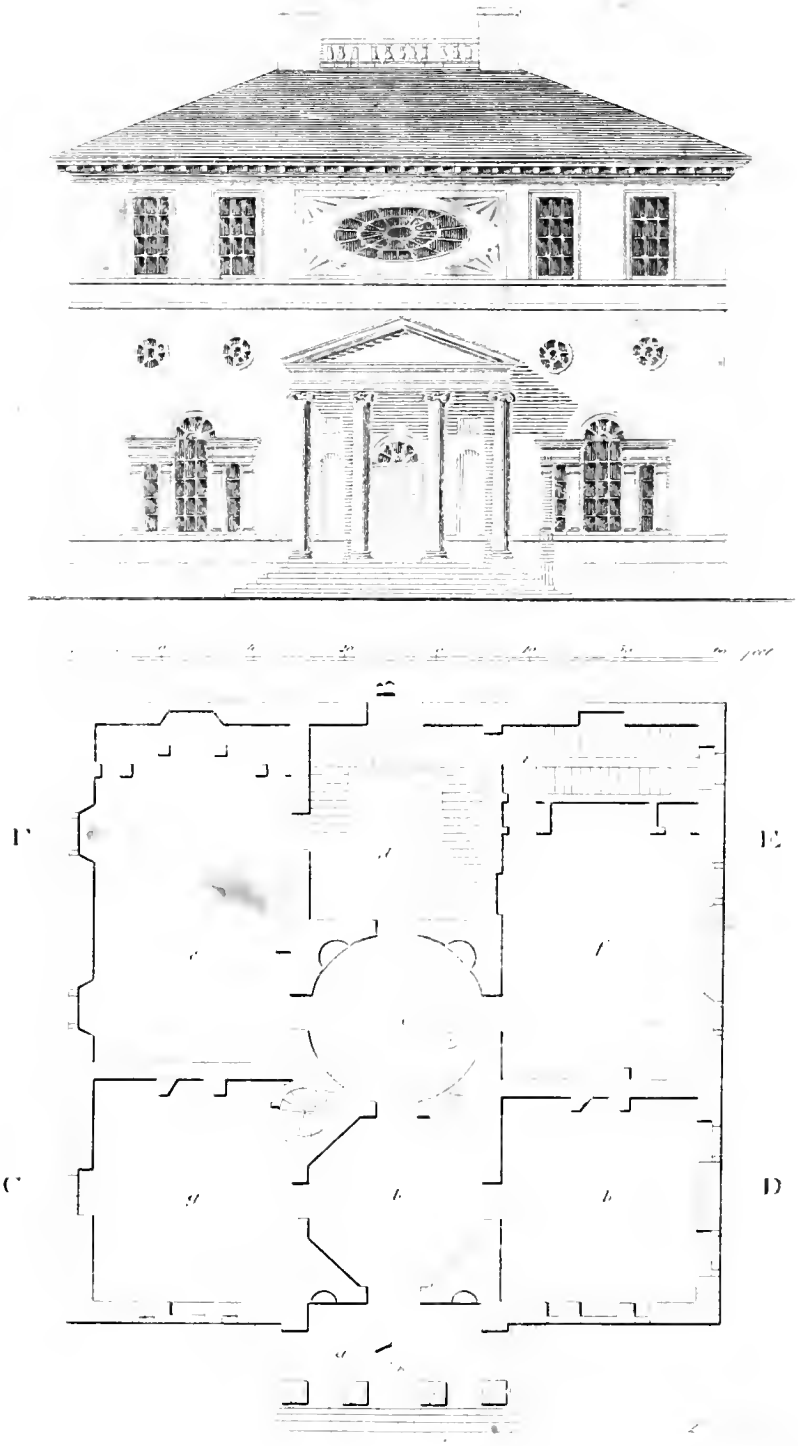


PLATE 49.



To proportion the Cornice to the height of the Building.

Divide the whole height into nineteen parts; one of these will be the height of the Cornice. This is a general rule, which may be varied to suit circumstances; as in a very high building, a steeple, for instance, it would be too much; and in a very low one, it would be rather too little; and, as every thing is in some degree regulated by fashion, this should be attended to. The present fashion would be something smaller than the above proportion.

PLATE 48.

Drawing Plans and Elevations.

In this Plate is given a Plan and Elevation of a small house. The Student, in drawing a Plan, will suppose the building to be raised just above the principal floor, and the wall made level all round; and draw his plan to resemble it as near as possible; placing the partitions, doors, and windows in their proper places. The stairs should be drawn for the whole story, to show where the landing for the next story will be. In drawing the ground-plan, it will considerably enliven the drawing to give the appearance of a shadow on one side of the wall, by drawing one line thicker than the other. To do this, he will suppose the light to come from the left hand upper corner of the drawing, and make the lines on the right hand and lower side of the walls and partitions thick, and the other sides thin lines. This will be better understood by closely inspecting the Plans that follow.

PLATE 49,

Is a design for a large building. The dotted lines A B, C D, and E F show the place on the ground-plan, through which the sections in the three following Plates are drawn; the letters on the sections corresponding with the letters on the plans.

The plan in this Plate is for the principal story or first floor,
and may be disposed of as follows.

a Portico.

b Hall. This is an octagon with the ceiling vaulted, and includes in its height the mezanine, or small story between the two principal ones. *See section of Plate* 38.

c Vestibule. This is lighted from a sky-light, and at the second story has a gallery which gives a communication with the different rooms. *See section of Plate* 38.

d Stairs.

e Saloon. This room includes in its height the mezanine, and has a music gallery. *See section of Plate* 40.

f Dining-room, with a recess for a sideboard.

g Library.

h Breakfast-parlor.

i Back-stairs.

PLATE 50,

Contains a section of the same building as the foregoing, with the plan for the cellar or basement story.

In drawing a section, the Student will pay strict attention that it agrees in all its parts with the plans for the different stories, and that the section represents the building, as it were, cut through from top to bottom, on the line of the plan, from which it is taken. A little liberty indeed may be taken with stairs, as, when the section cuts through them, to represent half of them would not be as clear as if all were shown.

The plan of this Plate may be disposed of as follows, *viz.*

a Maid-servants' room. The small stair gives a communication with the mezanine, and chamber over the library.
b House-keeper's room.
c Servants' hall.
d Back-stairs.
e Kitchen.
f Men-servants' room.
g h and *i* Beer and Wine-cellars, &c.

PLATE 51.

The same building continued. The plan is for the mezanine, or small story between the two principal stories. Of this, *a b c* and *d* are the upper parts of the saloon, stairs, vestibule, and hall; the others are small rooms for servants, &c.

Mezanine stories, or, as they are sometimes called, mezetti, are of use in a large building, where some of the rooms are so large as to require more height than common rooms, to be well proportioned; the mezanine being thrown into the height of the large rooms. And they also afford convenient chambers for servants, more particularly those whose business it is to attend on the Master and Mistress, by affording a room immediately under the chambers occupied by them, with a private stairs for communication. Were it not for this, in very large buildings, the Servants would frequently be unavoidably lodged at a considerable distance from the Heads of the Family.

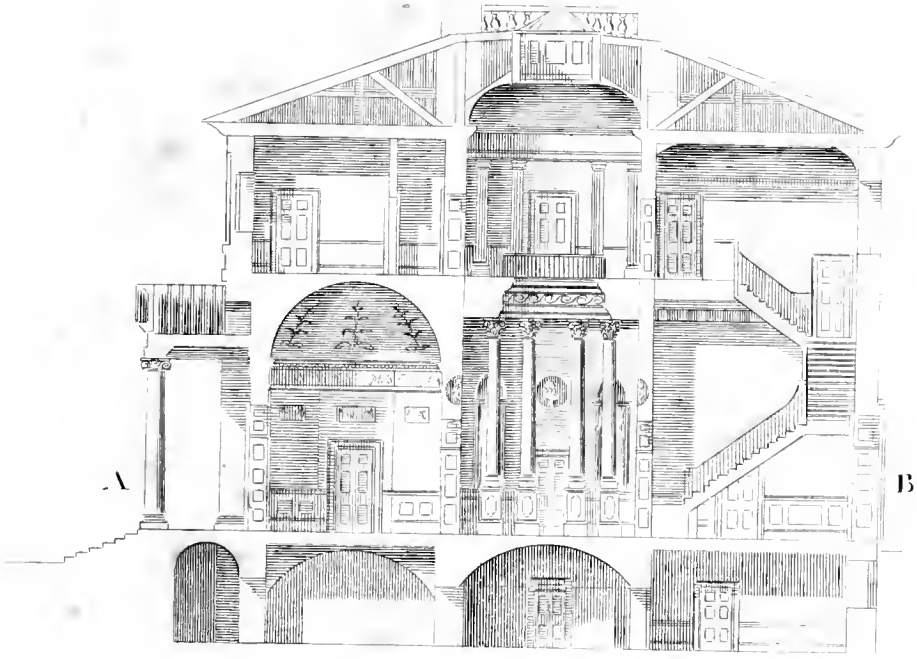
PLATE 52.

The same continued. The plan is for the second story, in which

a is the vestibule, with a gallery of communication from the stairs to the different rooms.

b and *c* two chambers, with each an antichamber or dressing-room. The rest are private chambers; except *d* and *e*, which are stairs.

PLATE 50.



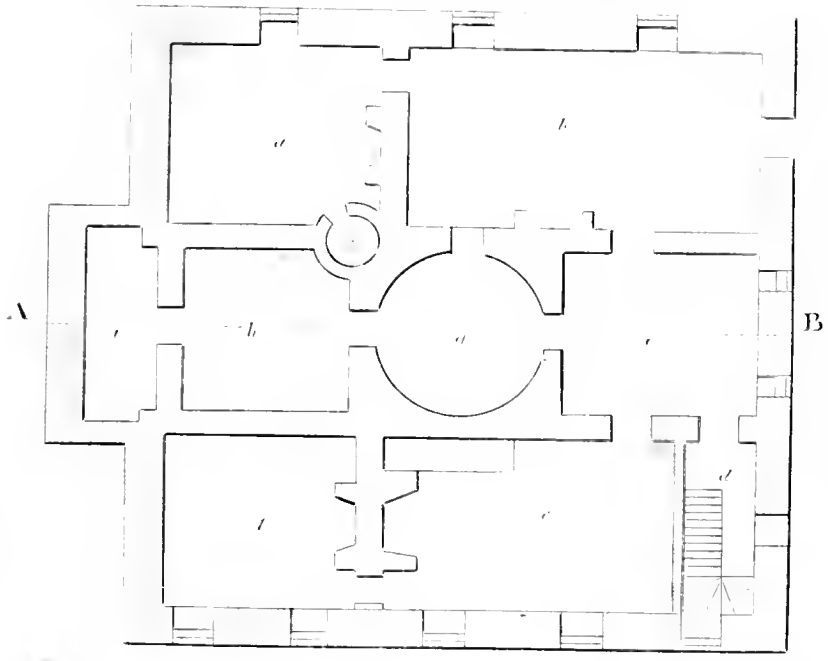
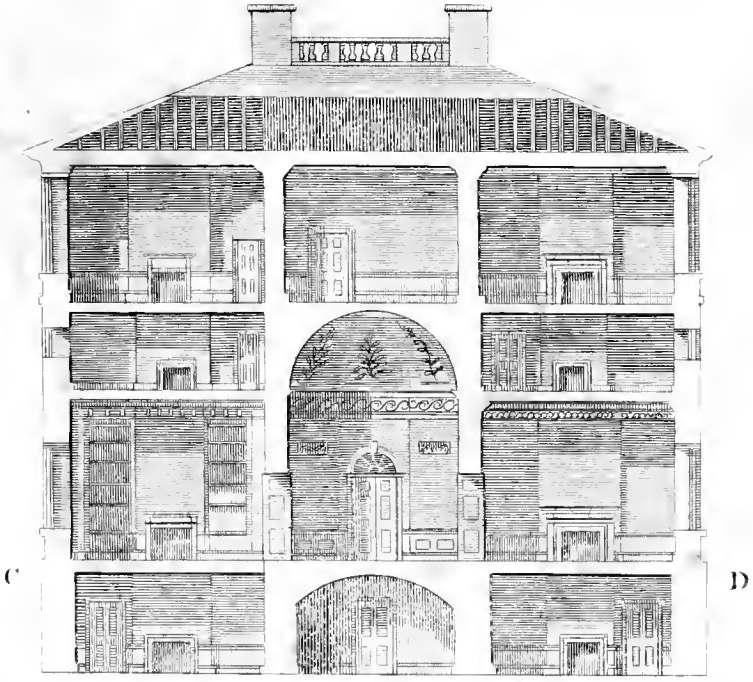


PLATE 51.



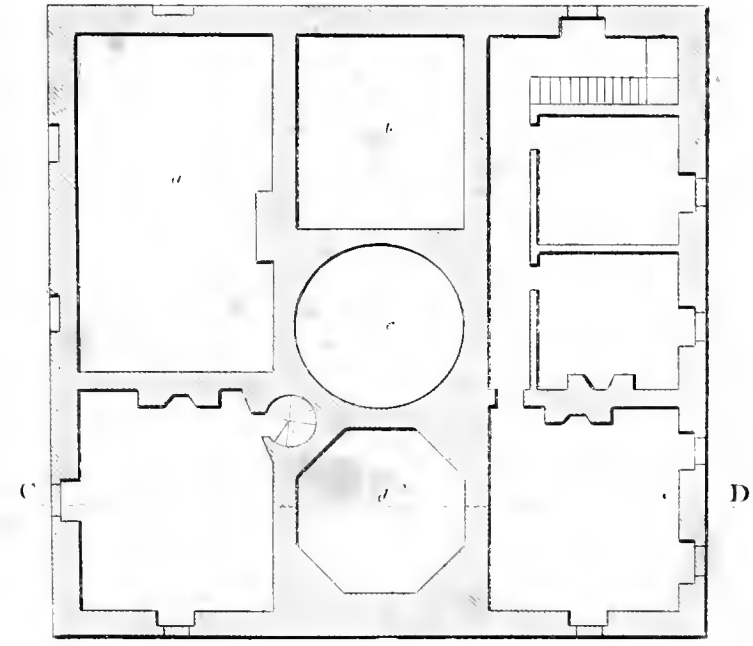
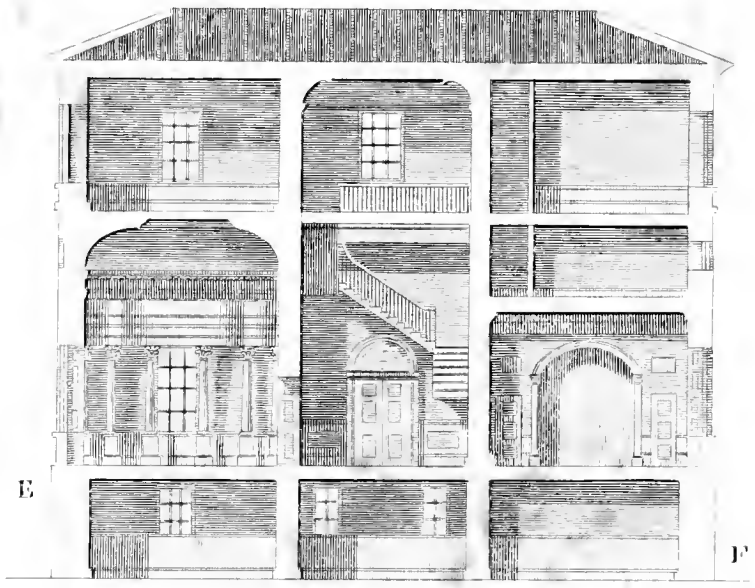
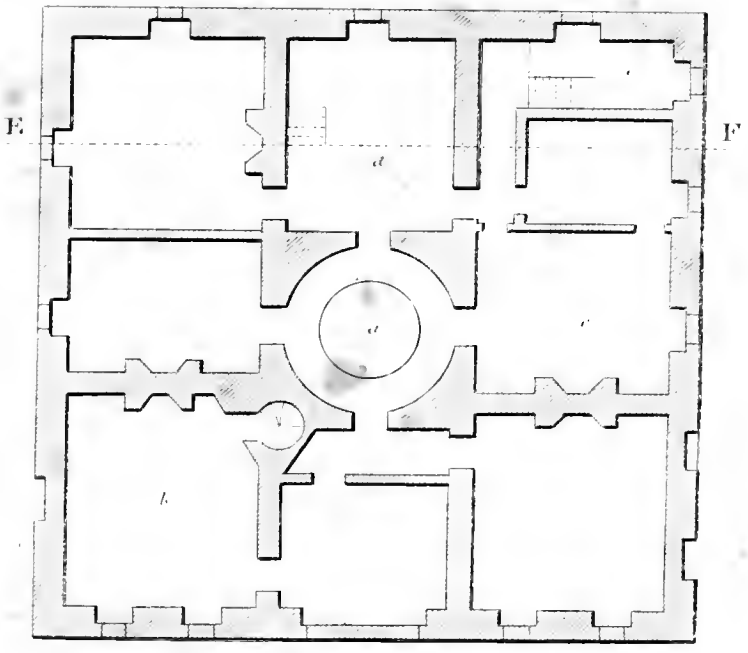


PLATE 52.





SKIRTING.

PLATE 53.

Fig 1

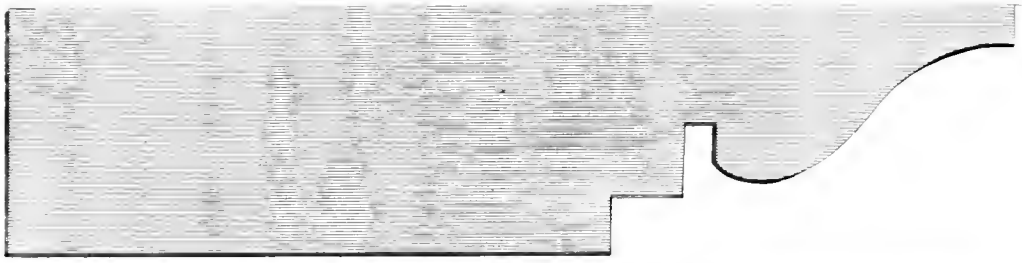


Fig. 2.

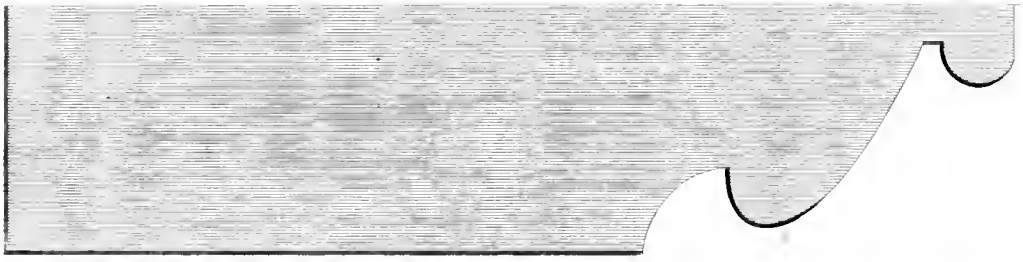


Fig 3.

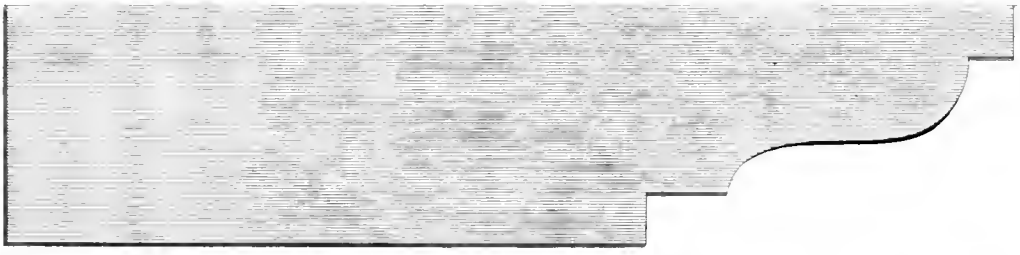


Fig. 4

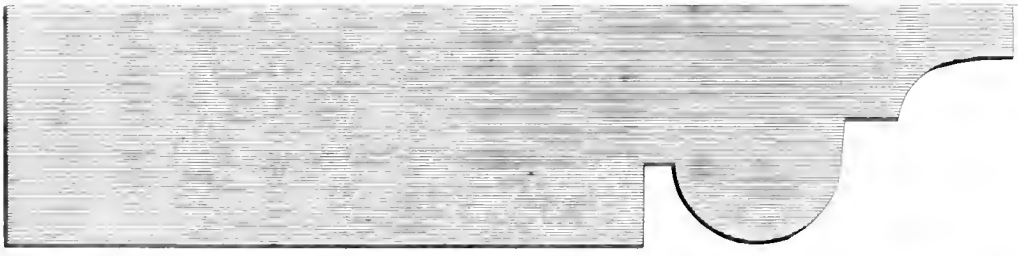


Fig 5.

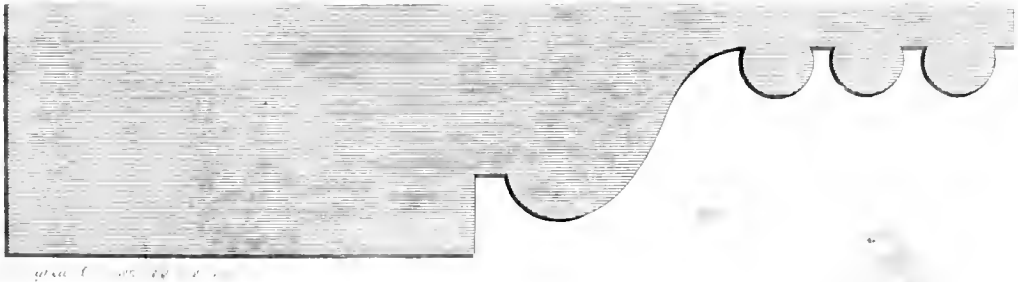
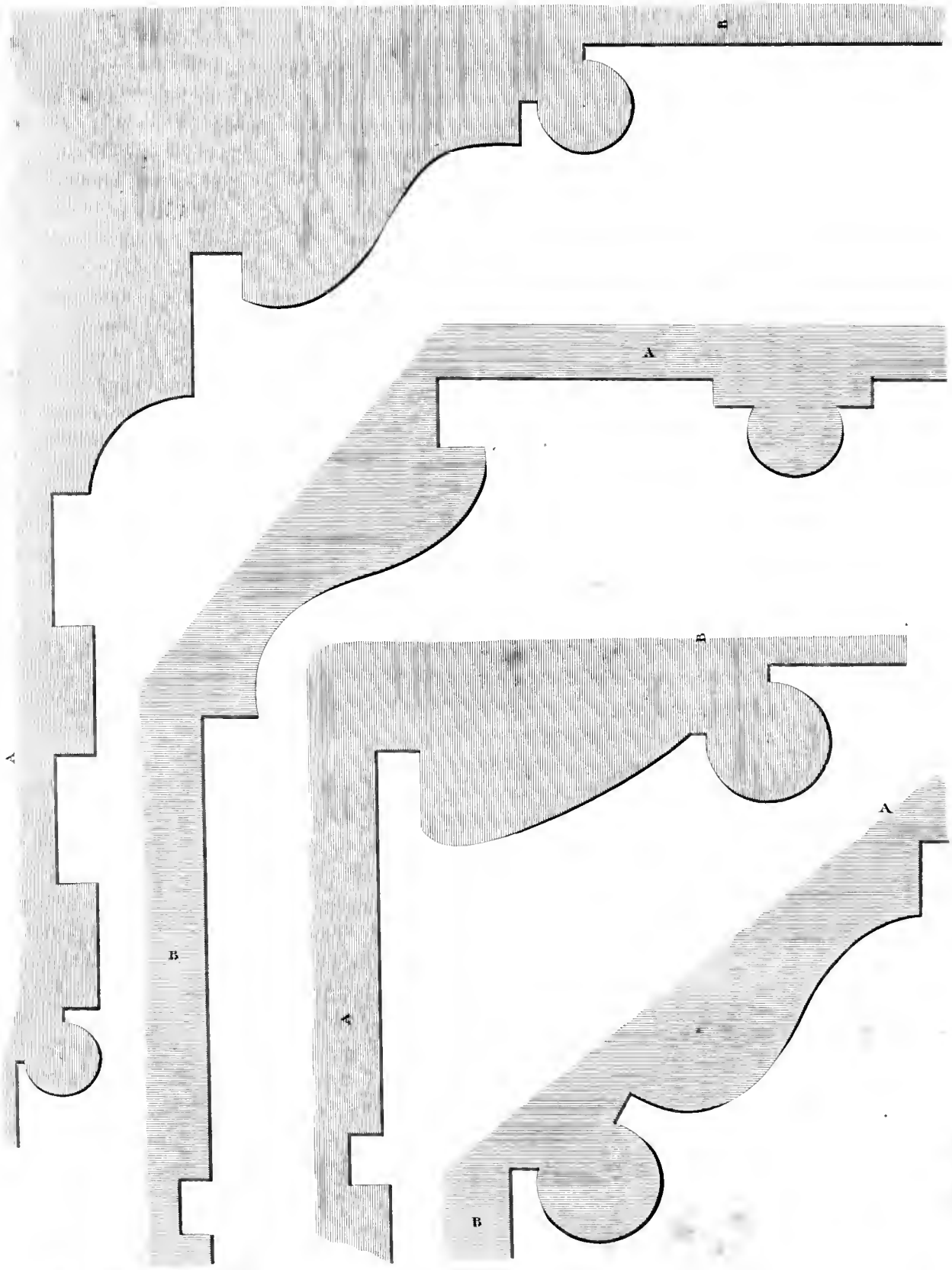


PLATE 54.



RAILING.

PLATE 55.

Fig. 1.

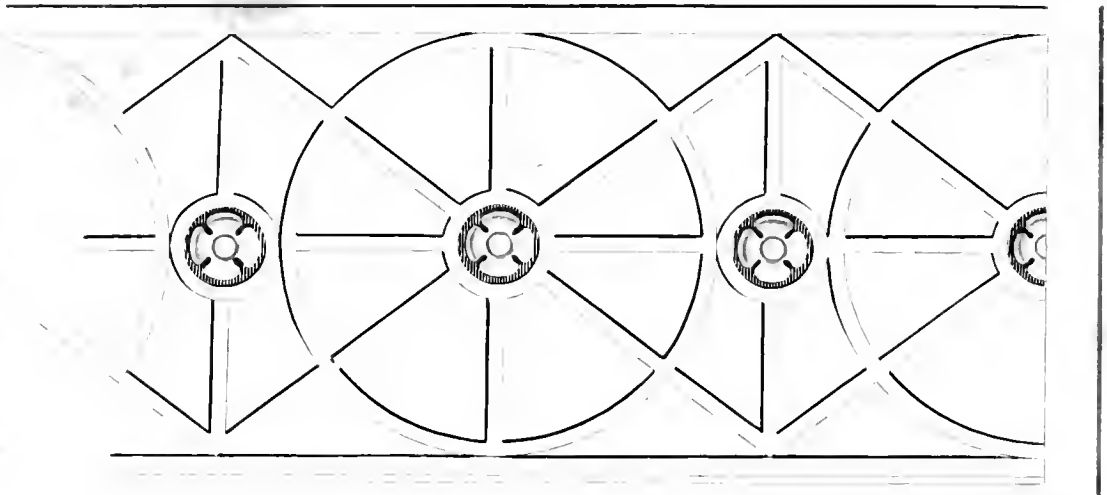


Fig. 2.

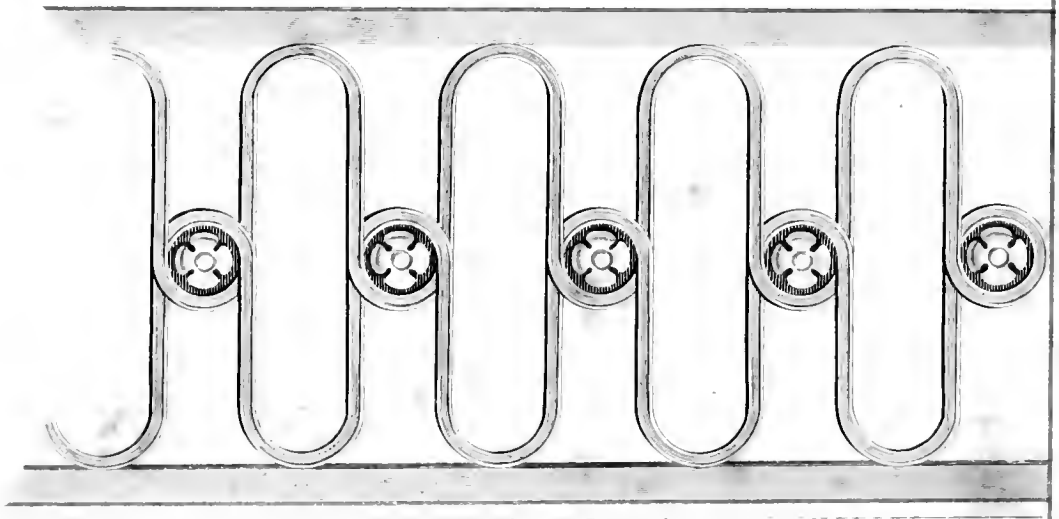
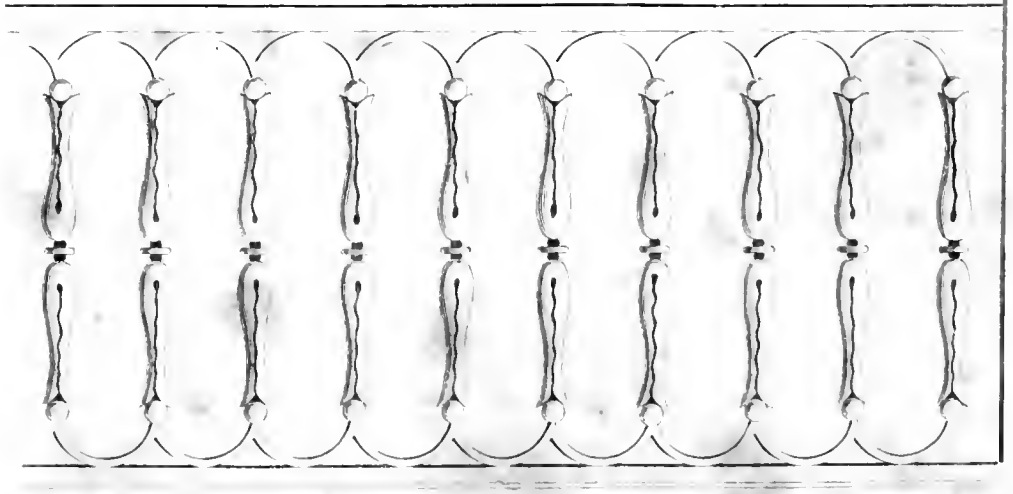


Fig. 3.



RAILING.

PLATE 56.

Fig 1.

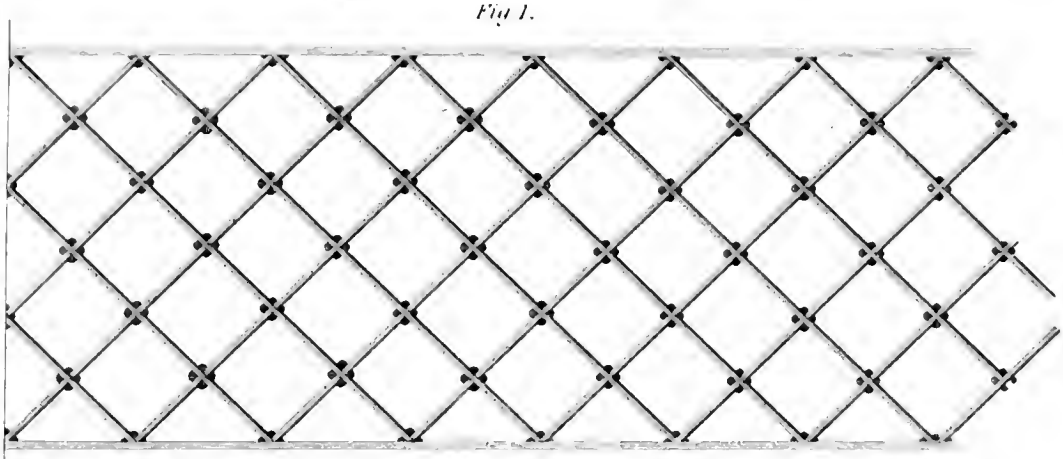


Fig 2.

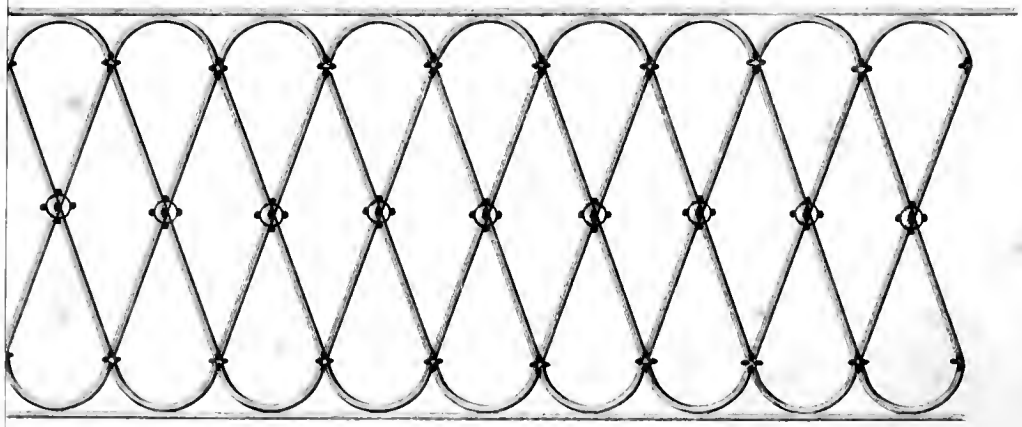
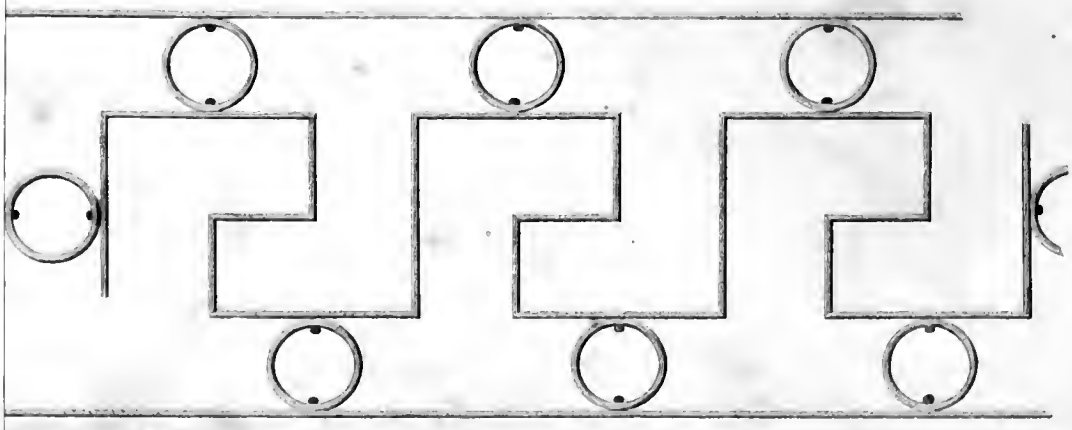


Fig 3.



In these plans, it has been more my object to throw as great a variety into a small compass, as was readily practicable, than to give eligible plans for the Builder; thereby aiming at instruction for the Student, which indeed has been my object throughout this Work.

SKIRTINGS.

PLATE 53.

Five designs for the mouldings of washboards or skirtings, the narrow boards round the margin of a floor, forming a plinth for the base of the dado, or simply a plinth for the room itself should there be no dado.

The skirting is either scribed close to the floor, or let into it by a groove: in the former case, a fillet is put at the back of the skirting to keep it firm.

STUCCO CORNICES.

PLATE 54.

Four profiles for ceilings of rooms, from the simple to the more enriched finish. A the line of ceiling; B the vertical surface of the wall.

RAILING.

PLATE 55.

Three designs for wooden rails, for balconies, piazzas, garden fences, &c.

PLATE 56.

Three designs for iron ditto.

CHURCH.

PLATE 57.

Plan and elevation of a design for a church of moderate dimensions; being 50 by 75 feet, exclusive of front steps and vestry-room. A the porch raised 6 rises high. B the vestibule, and staircase leading to the gallery. C the vestibule and staircase to the gallery on the right. D the grating through which the warm air passes into the church from a furnace underneath. E the centre aisle. FF the centre aisles. G the commu-

nion table and chancel. H the pulpit and reading desk. I the stairs to pulpit. K the vestry-room and library, the school-room for children of both sexes. Session and prayer meeting and lecture rooms are disposed in the basement, with an internal communication to them under the staircase B and C internally. The principal floor contains sixty-six pews; each pew is calculated to accommodate six persons, making in all three hundred and seventy-six; besides fifty in the public seats of the side aisles. The gallery contains about two hundred, including the portion occupied by the children and orchestra.

PRISON.

Prison, an edifice erected for the confinement of debtors and criminals, until they be discharged or convicted. The principal properties in the construction of a prison are those of strength and convenience. Strength is of the utmost consequence, in order to prevent the escape of the prisoners; and convenience, to promote their health; to have the apartments of their due size and arrangement, according to the different species of criminals, and to be handy in respect to the keeper.

Howard, in speaking of the situation of prisoners, says, "a county gaol, and indeed every prison, should be built on a spot that is airy, and, if possible, near a river or brook. I have commonly found prisons situate near a river the cleanest and most healthy. They generally have not (and, indeed, could not well have) subterraneous dungeons, which have been so fatal to thousands; and by their nearness to running water, another evil, almost as noxious, is prevented—that is, the stench of sewers.

"I said a gaol should be near a stream; but I must annex this caution, that it be not so near as that either the house or yard shall be within the reach of floods.

"If it be not practicable to build near a stream, then an eminence should be chosen; for, as the wall around a prison should be so high as greatly to obstruct a free circulation of air, this inconvenience should be lessened by rising ground; and the prison should not be surmounted by other buildings, nor built in the middle of a town or city.

"That part of the building which is detached from the walls, and contains the men-felons' ward, may be square or rectangular, raised on arcades, that it may be more airy, and have under it a dry walk in wet weather. These wards over arcades are also best for safety; for I have found that escapes have been most commonly effected by undermining cells and dungeons. If felons should find any other means to break out of this raised ward, they will still be stopped by the wall of the court, which is the principal security; and the walls of the wards need not then be of that great thickness they are generally built; whereby the access of light and air is impeded.

"I wish to have so many small rooms, or cabins, that each criminal may sleep alone. These rooms to be ten feet high to the crown of the arch, and have double doors, one of them iron latticed, for the circulation of air. If it be difficult to prevent their being together in the day-time, they should, by all means, be separated by night. Solitude and silence are favorable to reflection; and may, possibly, lead them to repentance. Privacy and hours of thoughtfulness are necessary for those who

must soon leave the world; (yet how contrary to this is our practice! Keepers have assured me, that they have made 5 £. a day after the condemnation of their prisoners.) In the Old Newgate there were fifteen cells for persons in this situation, which are still left standing, and are annexed to the new building.

"The separation I am pleading for, especially at night, would prevent escapes, or make them very difficult; for that is the time in which they are generally planned, and effected: this also would prevent their robbing one another in the night. Another reason for separation is, that it would free gaolers from a difficulty of which I have heard them complain: they hardly know where to keep criminals admitted to be evidence for the king: these would be murdered by their accomplices, if put among them; and in more than one prison, I have seen them, for that reason, put in the women's ward.

"Where there are opposite windows, they should have shutters; but these should be open all day. In the men-felons' ward the windows should be six feet from the floor; there should be no glass; nor should the prisoners be allowed to stop them with straw, &c.

"The women-felons' ward should be quite distinct from that of the men; and the young criminals from old and hardened offenders. Each of these three classes should also have their day-room, or kitchen, with a fire-place; and their court and offices all separate.

"Every court should be paved with flags, or flat stones, for the more convenient washing it; and have a good pump, or water laid in; both, if possible: and the pump and pipes should be repaired as soon as they need it; otherwise the gaols will soon be offensive and unwholesome; as I have always found them to be in such cases. A small stream constantly running in the court is very desirable. In a room, or shed, near the pump or pipe, there should be a commodious bath, with steps, (as there is in some country hospitals,) to wash prisoners that come in dirty, and to induce them afterwards to the frequent use of it. It should be filled every morning, and let off in the evening through sewers into the drains. There should also be a copper in the shed, to heat a quantity of water sufficient to warm that in the bath, for those that are sickly. There should also be an oven; nothing so effectually destroys vermin in clothes and bedding, nor purifies so thoroughly when tainted with infection, as being a few hours in an oven moderately heated.

"The infirmary, or sick wards, should be the most airy part of the court, quite detached from the rest of the gaol, and raised on arcades. These rooms should never be without cribs, beds, and bedding. In the middle of the floor of each room there should be a grate of twelve or fourteen inches square, for a current of air; covered with a shutter or hatch. The sewers, or vaults, of all prisons, should be in the courts, and not in the passages, and (like those in the cottages) close boarded between the seats up to the ceiling, the boards projecting ten inches before each seat.

"The infirmary and sheds will not render the court unsafe, provided the walls have parapets or small *chevaux-de-frize*.

"Debtors and felons should have wards totally separate: the peace, the cleanliness, the health, and morals, of debtors, cannot be secured otherwise.

"The ward for men debtors should also be over arcades, and placed on one side of the gaoler's house. This house should be in or near the middle of the gaol, with

windows looking into the felons' and the debtors' courts. This would be a check on the prisoners, to keep them in order; and would engage the gaoler to be attentive to cleanliness, and constant washing, to prevent his own apartments from being offensive.

"A chapel is necessary in a gaol. I have chosen for it what seems to me a proper situation. It should have a gallery, for women; for the latter should be out of sight of all the other prisoners; and the rest may be separated below. Bibles and prayer-books should be chained at convenient distances on each side; those who tear or otherwise damage them, should be punished."

PENITENTIARY.

A Penitentiary House is a place for the reception of criminals whose crimes are not so heinous as to meet severer punishment than solitary confinement and hard labor; and where means are practised to reclaim the vicious.

PLATE 58.

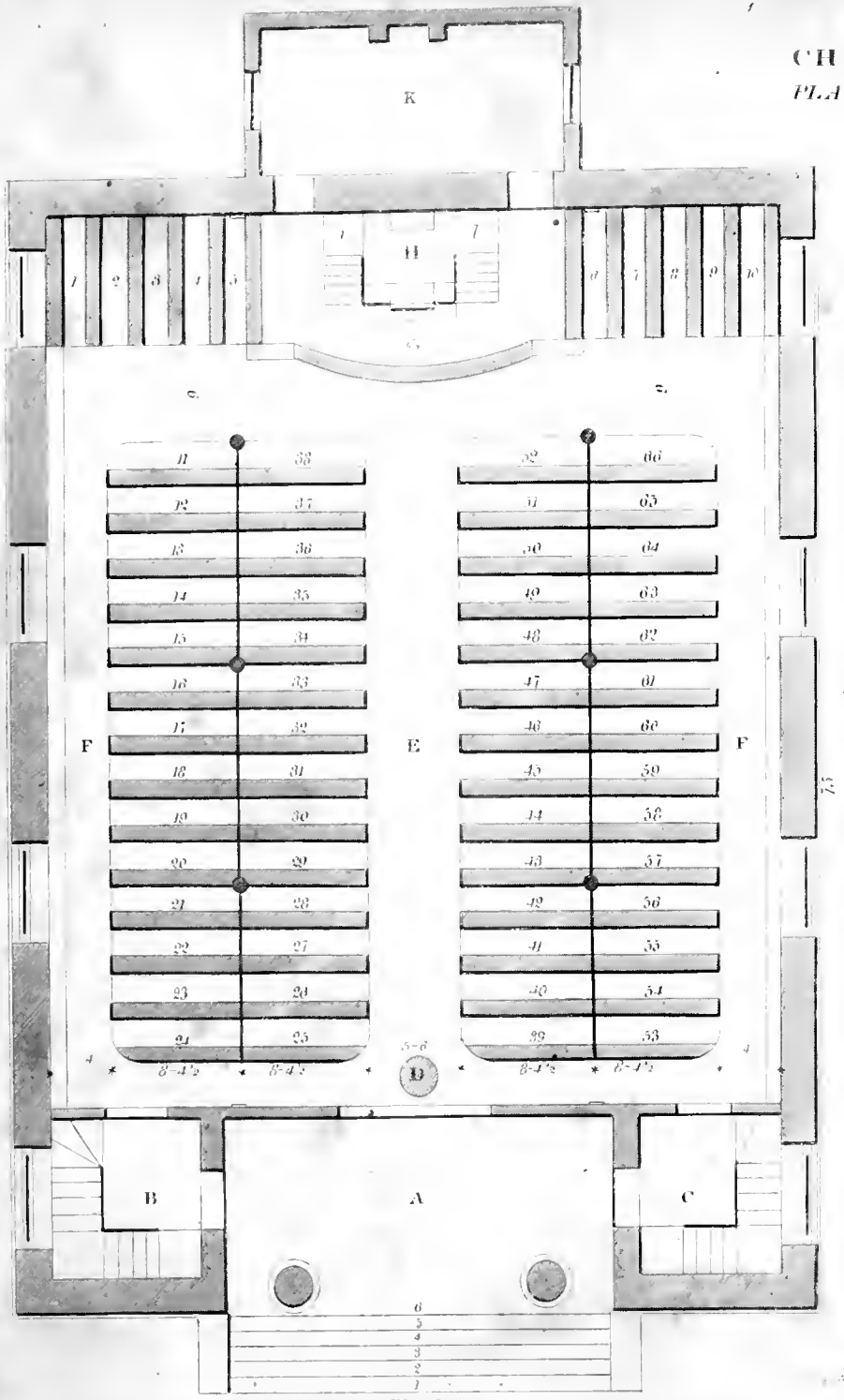
Plan and Elevation of a Design for a County Gaol.

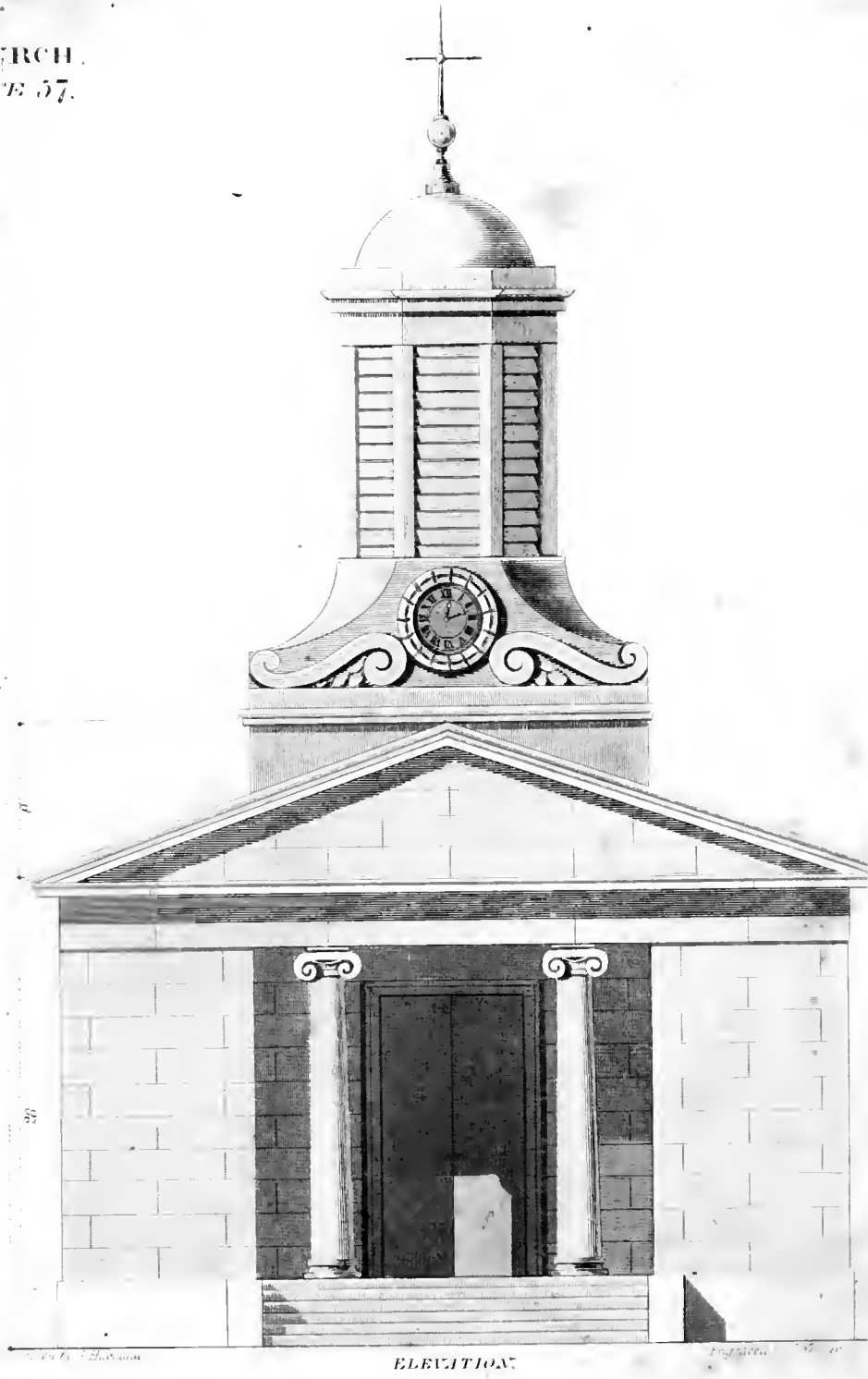
A, the porch and entrance. B, the lobby. C, entrance to the debtors' ward. D, entrance to the felons' ward. E, stairs to the apartments of the felons' keepers. F, stairs to the apartments of the debtors' keepers and infirmary. G, steps to the domestics' yard baths, and privies of the debtors. H, steps to the yard of the felons' domestics. I, yard of the domestics and keeper of felons' department. K, location of the felons' baths and privies. L, baths and privies of the debtors' ward. M, yard of the debtors' domestics. N, office of the debtors' ward. O, office of felons' ward. P, felons' cells. Q, passage of the felons' cells. R, passage of the debtors' ward. S, debtors' rooms. T, yard containing the privies and baths of the debtors. U, yard containing the privies and baths for the felons. V, exercising yard and work-shops of felons. W, exercising yard of debtors.

This building is designed to be erected three stories high. The front part occupied for the infirmary and sleeping-rooms of the keepers; the basement of the front, the cooking offices, and the basement of the gaol departments, to be open and arched, for the exercise of prisoners in wet weather, as well as to prevent excavation. The yard may be extended to any desired dimension, and the plan otherwise extended longitudinally, without interfering with the convenience and desired properties, so as to accommodate from fifty to two hundred prisoners. The proportion of the several rooms and other features of the design may be ascertained by referring to the scale to which it is drawn.

CHURCH.

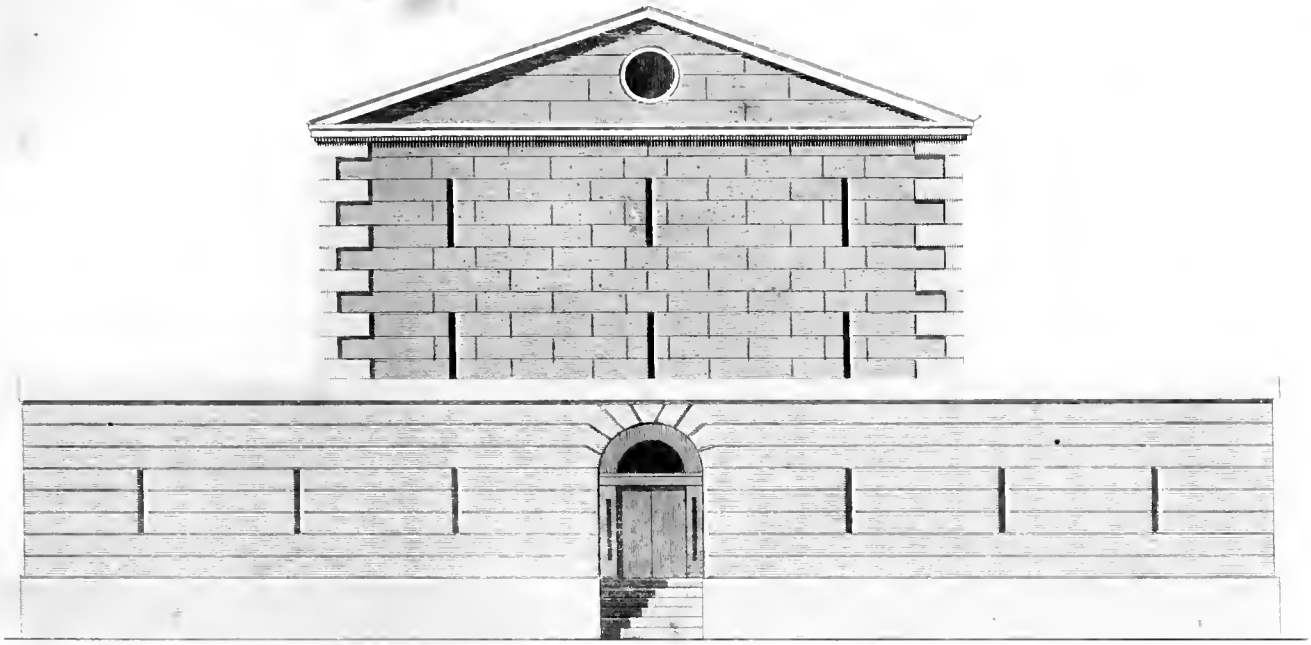
PLATE 57.





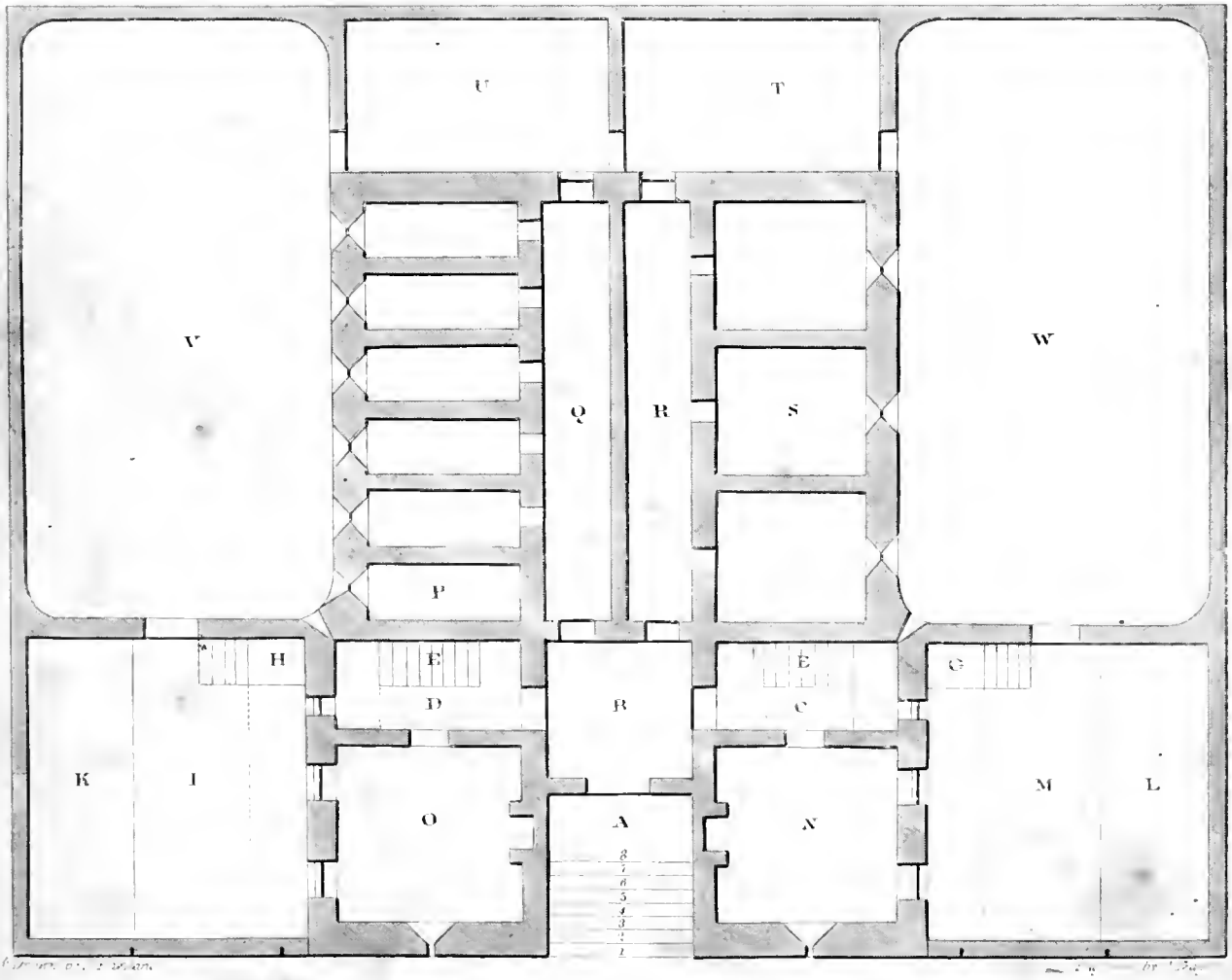
PRISON.

PLATE 58.



ELEVATION.

PLAN.



Scale of Feet

1 2 3 4 5 6 7 8 9 10 20 30 40 50 60 70

HOUSE.

House, a habitation, or a building constructed for sheltering a man's person and goods from the inclemencies of the weather, and the injuries of ill-disposed persons. Houses differ in magnitude, being of two or three and four stories; in the materials of which they consist, as wood, brick, or stone; and in the purposes for which they are designed, as a manor-house, farm-house, cottage, &c.

Ancient Rome consisted of 48,000 houses, all insulated or detached from each other.

It is a thing principally to be aimed at, in the site or situation of a country-house, or seat, that it have wood and water near it.

It is far better to have a house defended by trees than hills; for trees yield a cooling, refreshing, sweet, and healthy air and shade, during the heat of the summer, and very much break the cold winds and tempests from every point in the winter. The hills, according to their situation, defend only from certain winds; and if they are on the north side of the house, as they defend from the cold air in winter, so they also deprive you of the cool refreshing breezes, which are commonly blown thence, in the summer. And if the hills are situate on the south side, they then prove also very inconvenient. A house should not be too low seated, since this precludes the convenience of cellars. If you cannot avoid building on low grounds, set the first floor above the ground, the higher, to supply what you want to sink in your cellar in the ground; for in such low and moist grounds, it conduces much to the dryness and healthiness of the air, to have cellars under the house, so that the floors be good and ceiled underneath. Houses built too high, in places obvious to the winds, and not well defended by hills or trees, require more materials to build them, and more also of reparations to maintain them; and they are not so commodious to the inhabitants as the lower built houses, which may be built at a much easier rate, and also as complete and beautiful as the other. In houses not above two stories with the ground-room, and not exceeding twenty feet to the wall plate, and upon a good foundation, the length of two bricks, or eighteen inches for the heading course, will be sufficient for the ground-work of any common structure, and six or seven courses above the earth to a water-table, where the thickness of the walls abated, or taken in, on either side the thickness of brick, namely, two inches and a quarter.

For large and high houses, or buildings of three, and four, or five stories, with the garrets, the walls of such edifices ought to be from the foundation to the first water-table, the heading courses of brick, or twenty-eight inches at least; and at every story a water-table, or taking in the inside for the girders and joints to rest upon, laid into the middle, or one quarter of the wall at least, for the better bond. But as for the innermost or partition wall, a half brick will be sufficiently thick; and for the upper stories, nine inches or a brick's length will suffice.

We cannot multiply rules for the different parts of a house; since these must be modified by a variety of circumstances, in which the skill and judgment of the architect must direct: but we shall conclude this article with expressing a wish that contrivers of buildings would avail themselves more of an important modern discovery in natural history, viz. the superior levity of infectious and unwholesome air. The

upper sashes in most houses are too frequently immovable; in consequence of which, no part of the foul air above the level of the lowest rail of the other sash's greatest rise can escape by the window; and if it escapes by the doors, it is generally for want of a vent in the highest part of the roof, merely to accumulate in the upper story of the house, and add to the infection which the great quantities of old furniture usually stored up there are of themselves apt to create. Thus the chief advantage to be expected from lofty rooms is in a measure lost, whereas, were the upper sashes contrived so as to draw down, all the air might be easily changed, and that almost insensibly, by letting them down an inch or two. The upper sash might be often let down entirely, with less danger or inconvenience from cold, than the lower, thrown up the tenth part of an inch: though the doing of the former would be infinitely the most beneficial. It is perhaps on this principle that we are to account for the good health enjoyed by the poor who live crowded in damp cellars, and often with great numbers of rabbits, poultry, and even swine, about them. These cellars are open to the street, with doors reaching from the floor to the very ceiling, but never so close at bottom or at top as to prevent a free circulation of air; in consequence of which, that vivified fluid, as fast as it is spoiled by passing through the lungs of the inhabitants and their stock, or is infected by their insensible perspiration, excrements, &c. is driven out, and replaced by the fresh air.

PLATE 59.

Plan and Elevation of a Design for a County Town House.

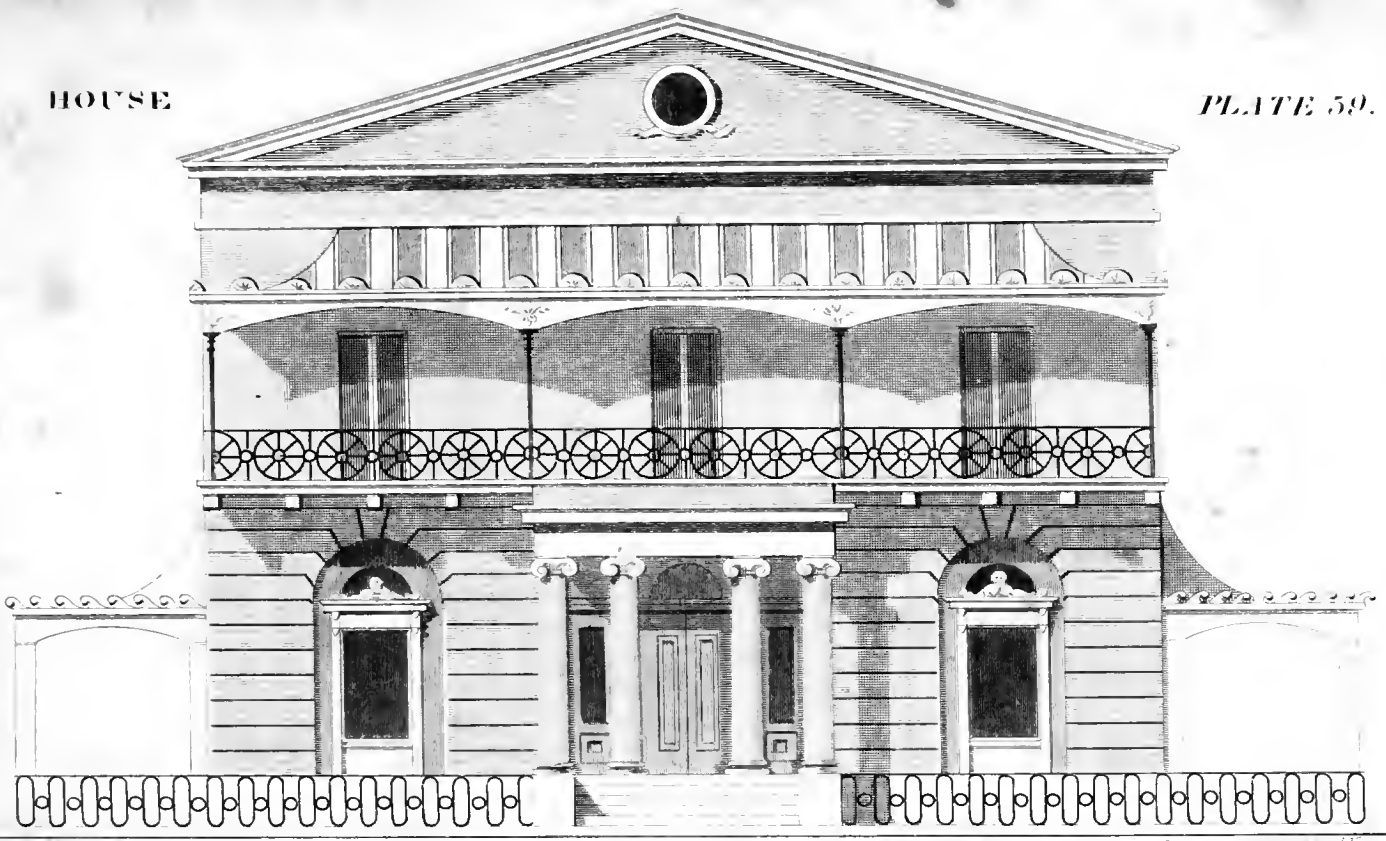
A, the porch. B, vestibule. C, saloon. D, best staircase. E, dining-room. F, drawing-room. G, library and study. H, private domestic staircase. I, china closet. K, parlor or breakfast room. L, conservatory. M, servants' piazza. N, family piazza.

BANK.

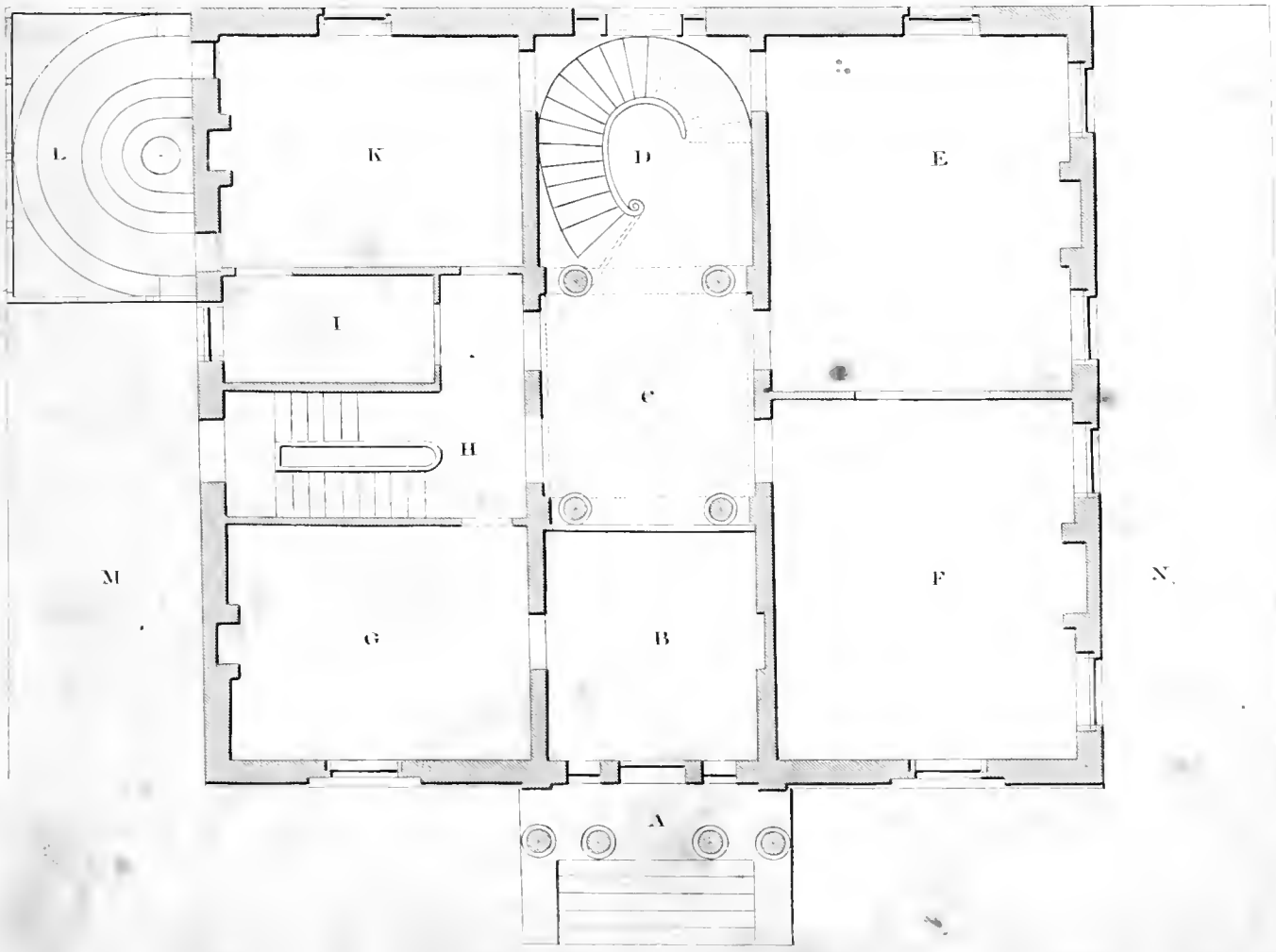
PLATE 60.

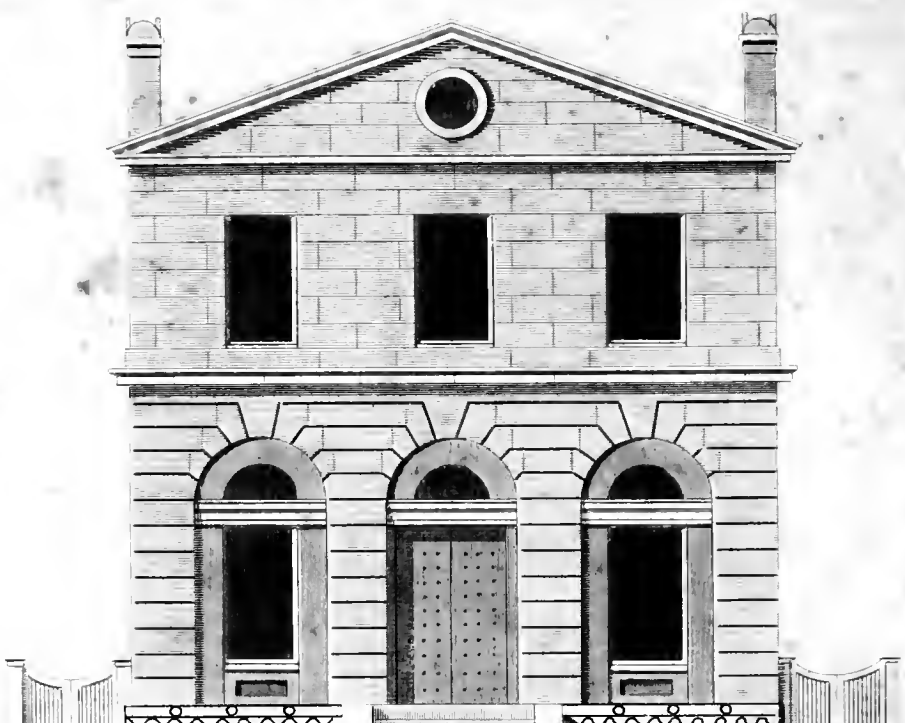
Plan and Elevation of a design for a Country Bank thirty feet wide, by fifty feet in length.

A, the private entrance to the dwelling part of the Building, to be occupied by one of its officers: the stairs communicate to a kitchen, parlor, and pantries, under the rear of the banking-room and vaults. B C, also to a drawing-room and chambers over the second floor, and domestic chamber of the roof. B, the note and specie vault. C, the vault for the books and other valuable papers, and records. D, double iron doors, formed on the most approved principles. E, niches for book-cases, &c. F, a table. G, the counter, and location of the note-desk. H, the receiving teller's desk. I, the paying teller's desk. K, the grate which admits the warm air from a furnace below. L L, long tables, with drawers. M, the space or passage of access for business, to the several officers. N, president's room. O, cashier's room. P, entrance, Q, steps to the entrance. R R, two descending sets of steps leading to offices under the president's and cashier's rooms, as well as to the director's room in the rear. It is here designed to form the floor and ceiling of the first floor fire-



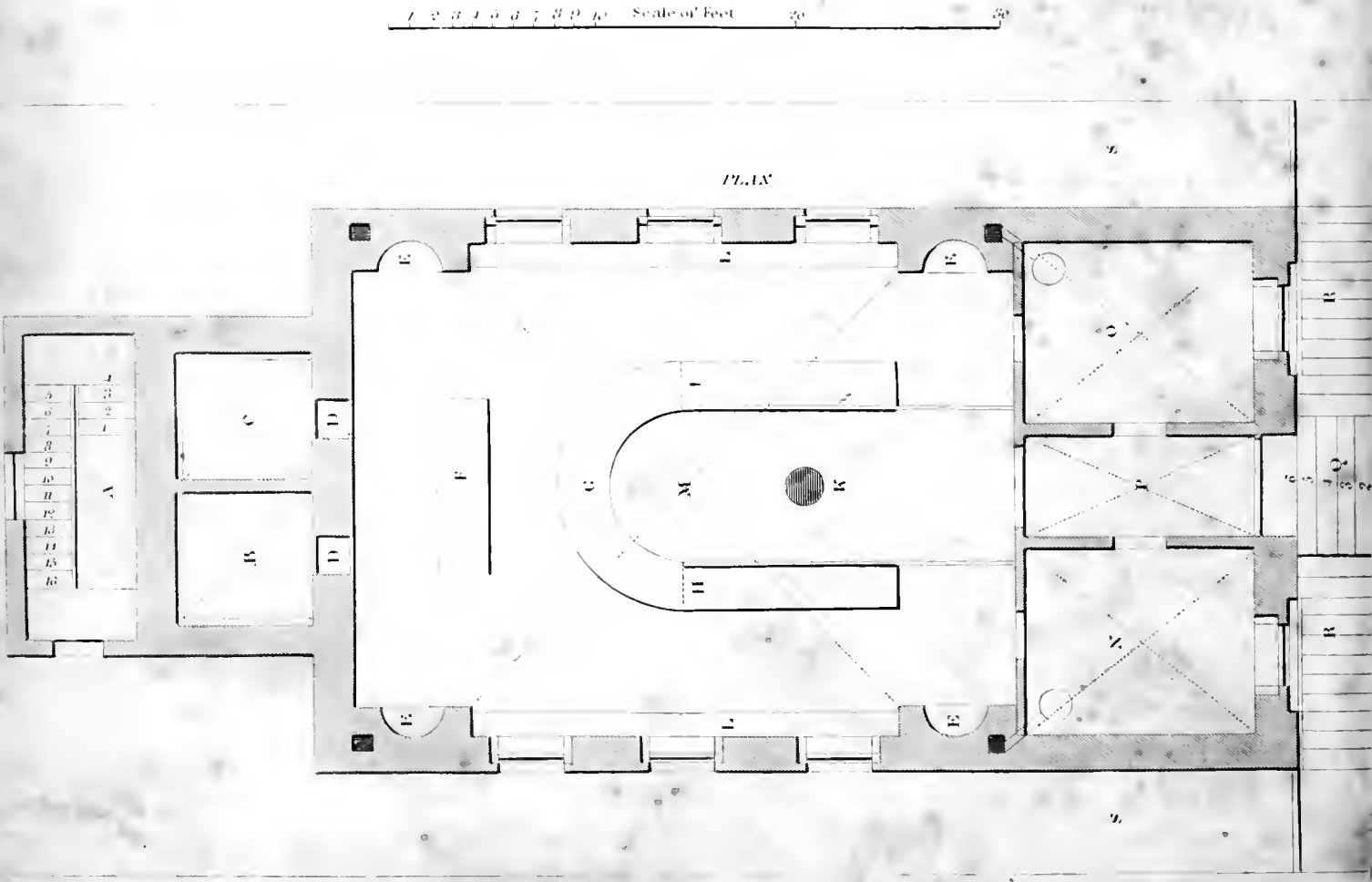
PLAN





1 2 3 4 5 6 7 8 9 10 Scale of Feet 20 30

PLAN



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proof, of brickwork; the banking room M to be grooved, and all the other rooms to be with barrel or cylindrical arches, and the roof covered with slate.

This building should be insulated at least twenty feet on either side, at S S, so as to afford sufficient light to the main room M, and secure from fire of the neighboring houses. A Bank has recently been executed by Mr. John Haviland, Architect, of Philadelphia, the author of this work, at Pottsville, Schuylkill county, Pennsylvania, and every feature of the front (not excepting the moulded cornices) formed of cast iron, in imitation of marble; and it is believed to be the first and only example of this material being employed in the whole *facade*. The iron plates are cast in lengths and form corresponding with the size and jointing of the stone-work, backed in with masonry two feet thick, and secured to the same by wrought iron ties, two and three to each plate: when finished, the whole was well painted and sanded with white sand, which gave the surface a very beautiful and uniform texture of stone, free from gloss and at the same time prevented its rusting. It is very much to be regretted that this valuable material is not more frequently used, as a substitute for the more perishable ones of wood, and expensive one of marble, or cut free-stone. Iron is not only more fire-proof, durable, and stronger, than wood, but also more economical and favorable to embellishment, than the marble or cut free-stone. When duplicates are required, the labor of carved and moulded work in one pattern, answers for all.

The following Plates I have been induced to give, as containing four different varieties in Architecture. Of these, it is difficult to say which is the most perfect.

PLATE 61,

Contains a draft of the Frame of the Bridge constructed, by a Company incorporated for that purpose, over the Schuylkill, at the west end of High or Market-street; with a section of the Bed of that River.

The westernmost pier of this Bridge is sunk in a depth of water, unexampled in Hydraulic Architecture, in any part of the world; the top of the rock on which it stands being 41 feet 9 inches below common high tides. Both piers were built within Coffer-dams. The dam for the western pier was of original and peculiar construction: the design furnished by William Weston, Esq. of Gainsborough, in England, a celebrated Hydraulic Engineer. An idea of its magnitude may be formed, when it is known that 800,000 feet of timber (board measure) were unavoidably employed *in* and *about* it. It was executed, under the orders of the Building Committee of the Board, consisting of the President and four, and sometimes five, Directors (to whom the master-workmen express great obligations) by Samuel Robinson, of this city. Every disadvantage to which such difficult undertakings are subject (the rock being, in sundry parts, nearly bare, and affording no footing for the piles) opposed the progress of this. So that it could not be ready for the commencement of the masonry, until the 25th of December, when the first stone was laid; and the work continued, in a severe winter, to the height then proposed.

The stone-work was done by Thomas Vickers, under the orders, and with the advice and constant attention, of the same Committee; assisted, on emergencies, by all the Members of the Board, and the Treasurer, who was eminently useful on every occasion. The *masonry* is executed on a plan suggested to the mason, uncom-

mon, if not new. The walls of the Abutments and Wings are *perpendicular*, without buttresses; and supported by interior *offsets*. These are found completely competent to support the pressure of the filling, without *battering* or *contreforts*. The *Abutments* are 18 feet thick: the *Wing-walls*, 9 feet at the foundations; retiring, by offsets, till at the parapets they are only 18 inches. The eastern abutment and wing-walls are founded on a rock. Those on the western side, are built on piles. There are upwards of 7500 tons of Masonry in the western pier. Many of the stones, composing both piers, weigh from 3 to 12 tons. A number of massive chains are stretched, in various positions, across the piers. These are worked in with the masonry; the exterior whereof is clamped, and finished in the most substantial and workmanlike manner.

The *Frame* of the superstructure was designed and erected by Timothy Palmer, of Newburyport, in Massachusetts. It is a masterly piece of workmanship; combining, in its principles, that of King-posts and Braces with that of a Stone arch. Half of each post, with the brace between them, will form the vousseur of an arch; and lines through the middle of each post would describe the radii, or joints. The letters *a b c*, &c. in the draught, refer to the same letters below; where the manner of connecting the timbers together, is shown on a larger scale. The position of the letters is the same, with respect to each piece, in both places. Two of these, *a* and *b*, are double, or in two thicknesses. There are 3 sections of the Frame, similar to the one represented. That in the middle divides the space into two equal parts; so that those passing, in opposite directions, are prevented from interfering with each other. The Platform for travelling rises only 8 feet from a horizontal line; and the Top or Cap-pieces, are parallel to this. Of the sections, the middle one has the most pressure; owing to the weight of transportation being thrown nearer to that section than towards the sides; to which the footways prevent its approach. These footways are 5 feet in width; elevated above the carriage-ways, and neatly protected by posts and chains. T. Palmer is the original inventor of *this kind* of Wooden-bridge Architecture. He permitted, with much candor, considerable alterations in the plan, on which he had erected several Bridges in New England. These were accommodatory to the intended Cover, and were so much approved by him, that he considers the Schuylkill Bridge superstructure the most perfect of any he has built.

After the erection of the Frame, the Editor was employed by the President and Directors to perform the workmanship of the covering, agreeably to a design furnished by them to him. This design of the Cover being original, it is more surprising that it has not many faults, than that few, if any, can be found; especially, as an accommodation to the Frame created unavoidable difficulties. The Editor was permitted to make some additions, with the approbation of the Building Committee. He feels himself grateful for the assistance he has had; and in participating with those who preceded him, in the approbation of the work, by the Board and their Committee. At their suggestion, the under-work of the side covering is done in imitation of masonry, by sprinkling the work with stone-dust on the painting, while fresh. The smalting or sprinkling was performed with so much ease and cheapness, that it is hoped it will introduce a like mode of ornamenting and protecting the surface of wooden elevations, of other descriptions, where protection and ornament are required.

Commodious Wharves, on each side of the river, have been made by the Company; not only to protect the foundations of the abutments and wings, but with a

view to profit. They co-operate with the other improvements, to give a new and interesting front to our city.

It is a peculiar and interesting fact, that (except the valuable assistance rendered in its commencement by W. Weston, who was then about returning to England) no scientific Engineer has been employed, in any part of this great undertaking. Neither the Board, nor their Committee, who have been constantly and actively engaged in all stages of the Work, profess a scientific knowledge of Hydraulic Architecture; though they have now gained much practical experience. Yet difficulties have been encountered, and overcome, which would have called forth the talents, and practical knowledge, of the ablest Engineer. The Mechanics and Workmen (T. Palmer and his Assistants excepted) had, from the beginning of the undertaking, new and unknown branches of their business to learn. Even T. Palmer is *self-taught* in the art of Wooden-bridge building; though he has carried it to such high perfection. It is, however, believed that this Bridge, in all its parts, both of masonry and woodwork, will not suffer by a comparison with one, so composed, in any part of the world. Its workmanship and materials will stand the test of the most rigid scrutiny. Both the plan and its execution reflect credit upon those concerned in the enterprise. So far as I have information, this is now the only *covered* wooden Bridge, in any country, except, perhaps, one over the Limmat, built by the same Swiss carpenter who erected that of Schauffhausen, since destroyed. I have frequently seen and carefully inspected the draughts of this much-celebrated Bridge, and I am confident that any intelligent and candid Architect, on examining the principles of both, would give a decided preference to the Schuylkill Bridge. The design is more simple, its strength is greater, its parts are better combined and more assistant to each other, and there is no useless timber, or unnecessary complexity, in any part.

What I have just observed, as to those engaged in the direction or execution of the work of the Schuylkill Bridge, is not intended as adulatory, or disparaging, to any persons. But I have an ardent hope that others, in similar undertakings, will be animated by their successful example; when laboring under the same, or greater disadvantages, arising from the want of experienced and scientific Professors of Architecture; although, where these can be had, for great undertakings, they ought, undoubtedly, to be employed.

As a well-wisher to all public improvements, as a mechanic, and one employed to close this eminently useful erection, I think it my duty to mention, and feel a sensible satisfaction in adding to the foregoing account;

That I have experienced the important advantages of ready and beneficial advice; clear, prompt, and explicit orders; and timely and ample supplies. Not a moment has been lost by delay and hesitation in directions, want of provision of materials, or deficiency in punctuality of payment. This has been constantly the case, through the whole progress of the business, as the workmen, preceding me in its more difficult stages, have testified. Though heavy expenditures have been inevitably required, the greatest attention to economy has been practised.

No interested or personal motives induce me to mention these circumstances. They are exemplary; and essential to insure the completion of any extensive enterprise. To them, I am persuaded, is to be chiefly attributed, the success of this arduous work. From inattention, or incapacity in these indispensable requisites, many public as well as private undertakings in all countries have failed; and Communities, and the individuals employed in them, have been involved in disappointment and distress; if not in irretrievable ruin.

The Bridge was six years in building, and cost about 300,000 dollars, including the cash-moiety of the purchase of the site; for which 40,000 dolls. were paid to the City Corporation; half in cash, and half in Bridge-shares.

	ft.	in.		ft.	in.
Length of the Bridge	550	00	Curvature or rise of the carriage-way or road	8	00
Abutments and wing-walls	750	00	Height in the clear over carriage-way	13	00
Total length	1300	00	Ditto from the surface of the river to the carriage-way	31	00
Span of small arches, each	150	00	Thickness of the pier	20	00
Ditto of middle arch	194	10	Length of ditto	62	00
Width of the Bridge	42	00	Depth of water to the rock at the western pier	41	9
Curvature of the middle arch	12	00	Ditto at the eastern pier	21	00
Ditto of small arches	10	00			

Amount of toll, when the work began, for the year 1799, arising from the Floating-bridge - $5,000
Present amount of toll on an average (1805) the rates of toll in several instances being lower than over the old Floating-bridge - 13,600
Tolls received for the year 1832 - 22,049 29

PLATE 62.

The Bank of Pennsylvania.

This beautiful Building is entirely of Marble, and is a neat specimen of the Ionic Order, taken from an ancient Greek Temple. The design was given by, and the building erected under the superintendence of, Benjamin H. Latrobe. The front extends 51 feet in width, and the whole building, including the Porticos front and back, is 125 feet in depth. This building was three years in hand, and was finished in the year 1799.

PLATE 63.

The Girard Bank.

This superb Building is an elegant specimen of the Corinthian Order; the proportions taken from a Roman Temple, called the Maison Quarrée, at Nismes, in the south of France. The front extends 94 feet by 72 deep, exclusive of the Portico. The design was given by Samuel Blodget, of this city, and was built about the year 1795.

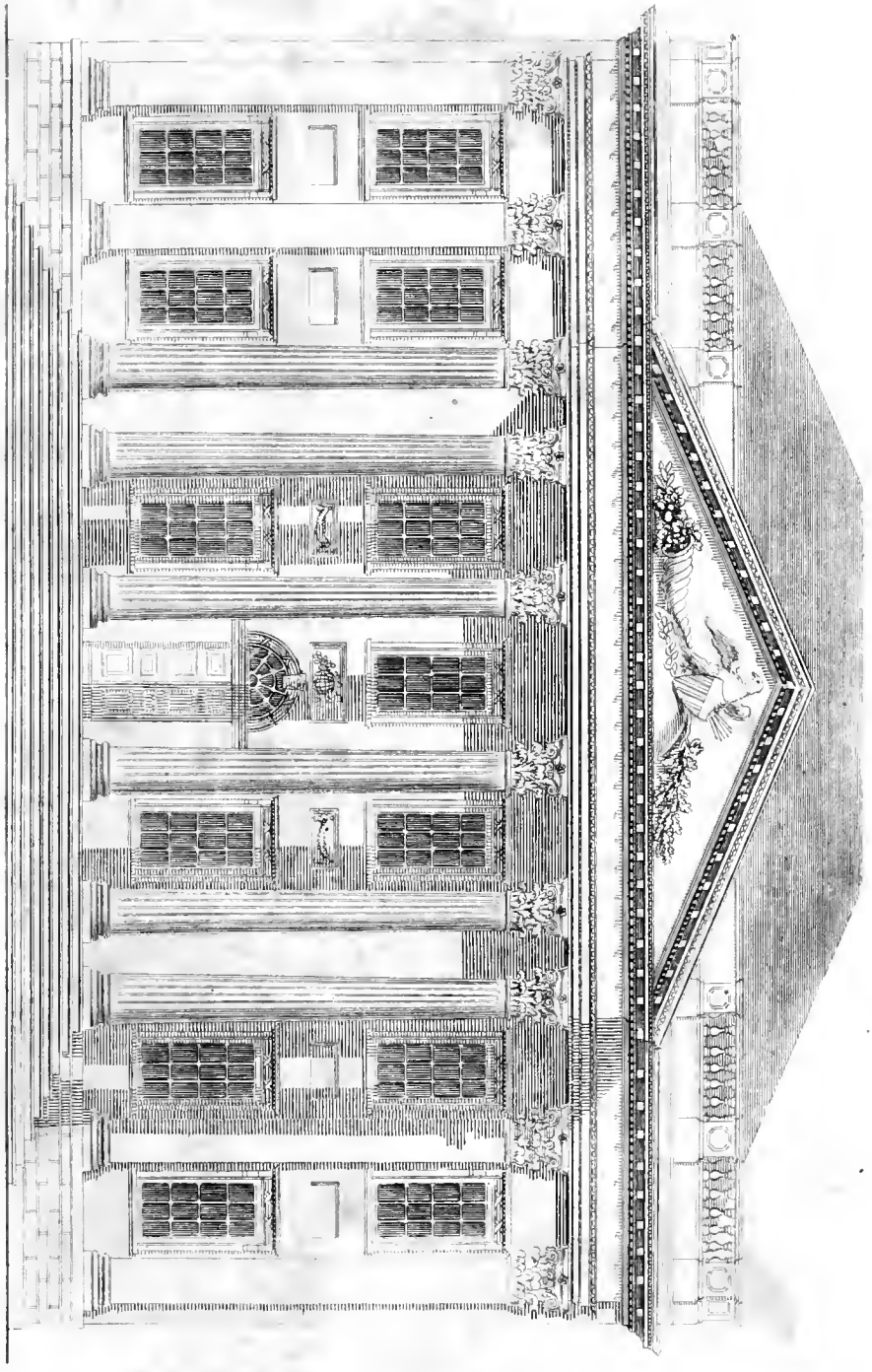
PLATE 64,

Contains an elevation of the Steeple of Christ Church, in Second street, which, for the justness of its proportions, simplicity and symmetry of its parts, is allowed by good judges to be equal if not superior in beauty to any Steeple, of the spire kind, either in Europe or America. It was erected in the year 1755, by Robert Smith, who some time after took out the sills of the wooden part, which had begun to decay, and replaced them by others.

The superstructure of this Steeple is composed of three distinct well-proportioned parts of Architecture; the first story, with its small Pediments and Attics, forming one; the octagonal part, with its ogee-formed Dome, being the second; and the spire and its pedestal, the third. These three parts are very dissimilar; no one having anything in it that is common to the others; and yet they agree very well with each other, forming one complete and consistent whole.

PLATE 62.

PLATE 63.



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A DICTIONARY

OF

TERMS USED IN ARCHITECTURE.

A.

ABACUS, the upper member of a column, which serves as a covering to the capital; to the Tuscan, Doric, and Ionic, it is square; to the modern Ionic and Corinthian, each side is arched, or cut inwards, and is decorated in the centre with a flower or other ornament.

Acanthus, a plant, whose leaves form an ornament in the Corinthian capital, and are said to have originally given rise to that order.

Acroteria, a kind of base, placed on the angles of pediments, usually for the support of statues, &c.

Alae, *Aisles;* also passages in theatres, houses, &c. also in rooms, &c. the space between the walls and the columns.

Amphitheatre, a place for exhibiting shows, very spacious, of a round or oval figure, with many seats rising on every side. The area in the middle was called *Arena*, because it was covered with sand, or sawdust, to prevent slipping, and to absorb blood.

Annulet, a small square moulding, which serves to crown or accompany a larger, and to separate the flutings in columns.

Antæ, a species of pilasters on the extremity of a wall, usually having no diminution; nor do the mouldings of their capitals or bases always resemble those of the columns.

Aqueduct, an artificial canal, built for the conveyance of water from one place to another, either running under ground, or rising above it.

Arch, part of a circle or ellipsis.

Architrave, the lowest principal member of an entablature, lying immediately upon the abacus of the capital.

Astragal, a small round moulding with two annulets.

Attic Base, Ionic base.

B.

Baluster, a small column, or pillar, of wood, stone, &c. used on terraces or tops of buildings for ornament, and to support railing, and, when continued, form a *balustrade.*

Banister, an improper name for baluster.

Band, a general term for a low, flat, or square member.

Base, the lower and projecting part of a column and pedestal, on which the shaft is placed.

Butment, or *Abutment*, supporters, or props, on or against which the feet of arches rest.

Buttress, a kind of butment, built sometimes archwise, as in Gothic buildings; a mass of stone or brick work, serving to prop or support buildings, walls, &c. on the outside, where their great height, or weight, requires additional strength.

C.

Capital, the uppermost member of a column, which is a crown or head thereto, placed immediately over the *shaft*, and under the *architrave*. No column is complete without a capital, which has a distinguishing character for each order. Tuscan and Doric capitals consist of mouldings; Ionic and Corinthian capitals, of leaves and other ornaments.

Cartouch, an ornament in sculpture representing a scroll of paper, &c.

Caryatides, a kind of order in Architecture, in which a female figure is applied instead of a pillar; the origin of which is thus handed down by Vitruvius: The inhabitants of Caria, a city of Peloponessus, made a league with the Persians against their own nation; but, the Persians being worsted, they were afterwards besieged by the victorious party, their city taken and reduced to ashes, the men put to the sword, and the women carried away captives. To perpetuate the memory of this victory, the Conquerors caused public edifices to be erected, in which, as a mark of degradation and servility, the figures of the Captives were used instead of columns, thus handing down to posterity their servility and punishment. When figures of the male sex are used, they are called *Persians* or *Perses.*

Cavetto, a concave moulding of one-quarter of a circle.

Caulicoli, the little twists or volutes under the flower on the abacus, in the Corinthian capital, represent

the twisted tops of the acanthus stalks; are called also *Helices*.

CELL, in an ancient temple, is the inclosed space within the walls.

CENTERING, or *Centre*, the support of an arch while the Masons are building it.

CINCTURE, a ring, list, or fillet, at the top and bottom of the shaft of the column.

CIRCUS, a large building for exhibiting equestrian exercises in.

COFFER-DAM, a large frame constructed for the purpose of erecting works on the bottom of deep waters; the Coffer-dam being water-tight, and surrounding the place intended to work on, is emptied of the water, and leaves the bottom bare.

COLLAR-BEAM, timbers placed across a roof from the middle of one rafter to another.

COLLARIN, or *Collarino*, the neck or frieze of a Tuscan or Doric capital.

COLONNADE, a series or continuation of columns.

COLUMN, a round pillar used in Architecture, to adorn or support. Columns are of four kinds; the *Tuscan*, *Doric*, *Ionic*, and *Corinthian*, each of which has its particular proportion. The term includes the base and the capital.

CONGE, a small moulding which serves to separate larger ones; called also *List* or *Annulet*.

CONSOLE, an ornament cut on the key-stone of arches, with a projection, capable of supporting, busts, vases, &c.

CONTOUR, the outline of a figure, or piece of Architecture.

COPING *of a wall*, the top or covering made sloping to throw off water.

CORBEILLE, carved work, representing a basket with fruits or flowers, serving as a finish to some other ornament. It sometimes is applied to the vase of the Corinthian capital, the word originally meaning a basket.

CORINTHIAN *order*, one of the four orders of Architecture.

CORNICE, the upper assemblage of members in an entablature, commencing at the frieze. Each order has its particular cornice, with suitable enrichments. To the *Tuscan* it is quite plain; to the *Doric* are added *guttæ*, or bells in the *soffit;* the *Ionic* has plain modillions; the *Corinthian* is much enriched, and has modillions.

CORONA, a large flat and strong member in a cornice; called also the *Drip* or *Larmer*. Its use is to screen the under part of the work, and, from its shape, to prevent the water running down the column. It has always a large projection, to answer its proposed use.

CORRIDOR, a gallery or passage in large buildings, which leads to distinct apartments.

CUPOLA, a round roof or dome, in the form of an inverted cup.

CYMA, *Cima* or *Cymatium*, a species of moulding, which is generally the upper one to an entablature. There are two sorts of this moulding, the *cyma recta* and *cyma reversa*, which is commonly called an *ogee*.

D.

DENTIL, an ornament resembling teeth, used in Ionic and Corinthian cornices.

DIE, the square or naked piece in a pedestal, that part which is between the base and the capital.

DOME, a spherical roof. See *Cupola*.

DORIC *order*, one of the four orders of Architecture.

DROPS, or *Guttæ*, in the Doric entablature, are small inverted pyramids or cones, immediately under the triglyph.

E.

ECHINUS, is properly the egg and anchor ornament, peculiar to the *Ionic* capital. It is sometimes used for the whole member, instead of *ovalo*.

ENTABLATURE, an ornament or assemblage of parts, supported by a column or pilaster over the capital. Each order of columns has a peculiar entablature, divided into three principal parts; the *architrave*, which is divided into two or more *fascia*, and rests upon the capital. The *frieze* is next, and may be plain or ornamented. The *cornice* is the top or crowning part.

F.

FAÇADE, the front view or elevation of a building.

FASCIA, a flat member in the entablature of an order, representing a band or broad fillet in an architrave. If divided, these divisions are called the first fascia, the second fascia, &c.

FILLET. See *Annulet*.

FLUTINGS, the hollows or channels, which are cut perpendicularly in columns by way of ornament, and which should always both begin and end in the shaft, near the extremity of the apophyges; though there are examples to the contrary. When flutings are used, the capital should be enriched.

FOLIAGE, an assemblage of leaves.

FRET, an ornament laid on plain narrow surfaces, formed by one or more fillets running along in a zigzag direction; generally in right angles, and keeping a space between each fillet equal in width to the fillet itself.

FRIZE, or *Frieze*, the middle member of an entablature; having the architrave below, and the cornice above.

FRONTISPIECE, sometimes signifies the whole face or aspect of a building; but is more properly applied to the decorated entrance of a house.

FUS—MOU

FUST, the shaft of a column, or that part which is between the base and the capital.

G.

GIRDERS, large pieces of timber in flooring, laid from one wall to another, when the distance is too great for common joists.

GLYPHS, the perpendicular channels cut in the *triglyphs* of the Doric frieze.

GOTHIC, a peculiar style of Architecture, distinct from the Grecian or Roman, derived from the Goths, or rather from the Saracens.

GUILLOCHES, ornaments made by circular fillets crossing and recrossing each other, generally encompassing a patera or flower.

H.

HAMMER-BEAM: when the ceiling of a large building is vaulted, the tie-beam of the roof is broken in the middle, and raised to admit of the curvature of the ceiling; the middle of the beam being secured to the collar-beam, it is then called a hammer-beam.

I.

IMPOST, a facia or small cornice which crowns a pier or pilaster, and from which an arch springs.

INSULATED, standing alone, or detached from any contiguous building, &c.

INTERCOLUMNIATION, the space between two columns.

IONIC *order*, one of the four orders of Architecture.

K.

KEY-STONE, the highest stone of an arch; to which a projection is usually given, and which is sometimes cut in ornaments.

KING-POST, the middle upright post in a set of principal rafters in large roofs; being supported by the rafters, it supports the middle of the beam, and keeps it from sagging.

L.

LACUNARIA, panels or coffers in ceilings, or in the soffits of cornices, &c.

M.

METOPÆ, the interval or square space between the triglyphs in the Doric frieze.

MEZZANINE, or *Mezzetti*, small or low stories between principal ones, used as servants' apartments.

MINUTE, an *architectonic measure;* the lower diameter of a column divided into sixty parts, each part is a *minute*.

MODILLION, an ornament resembling a bracket, in the Ionic and Corinthian cornices.

MOULDINGS, those parts which project beyond the base or perpendicular face of a wall, column, &c. intended only for ornament, whether round, flat,

MUT—PRI

or curved. The regular mouldings are 1st, the *list* or *annulet;* 2d, the *astragal* or *bead;* 3d, the *cyma reversa*, or ogee; 4th, the *cyma recta;* 5th, the *cavetto*, or hollow; 6th, the *ovolo*, or quarter-round; 7th, the *scotia;* 8th, the *torus*.

MUTULUS, an ornament in the Doric cornice, answering to a *modillion* in the Ionic and Corinthian entablatures.

N.

NICHE, a cavity or hollow in a wall for statues, &c.

O

OBELISK, a tall pyramid.

OGEE, a *cyma reversa*.

ORDER, in Architecture, a column entire, consisting of *base*, *shaft*, and *capital*, with an *entablature*.

OVA, or *ovum*. See *Echinus*.

OVOLO, a moulding which projects one-quarter of a circle; called also a *quarter-round*.

P.

PEDESTAL, a square body on which columns, &c. are placed.

PEDIMENT, a low triangular ornament in the front of buildings, and over doors, windows, &c.

PIER, a kind of pilaster or buttress, to support, strengthen, or ornament. The pier of a bridge, is the foot or support of the arch. The wall between windows or doors. Also, square pillars of stone or brick, to which gates are hung.

PERYSTYLIUM, a range of columns or colonnade, within a court or building like a cloister.

PIAZZA, a continued archway or vaulting, under which to walk, &c.

PILASTER, a square pillar or column, usually placed against a wall.

PILLAR. This word is generally used in Architecture, in common with *Column;* though, strictly speaking, they are different: thus, the supporters in Gothic Architecture are pillars; but can never be properly termed columns, varying in shape and every particular from the latter.

PLANCEER, a reversed plan of a cornice or other moulding; or a view of the same from below.

PLAT-BAND, any flat square moulding with little projection. The different fascias of an architrave are called plat-bands; the same is applied to the list between flutings, &c.

PLINTH, the lower member of a base.

PORTICO, a continued range of columns covered at top, to shelter from the weather; also, a common name to buildings which have covered walks supported by pillars.

PRINCE-POST, a post placed upright, in framing of principal rafters, between the king-post and the end of the tie-beam, giving additional support to the tie-beam.

PRI—SOF

Principal rafters. Large roofs are supported by sets of framing placed at from 8 to 10 feet apart: these frames are generally composed of tie-beams, king-posts, prince-posts, braces or trusses, and rafters.

Profile, the outline or contour of any building, &c.

Purlines, square pieces of timber laid from one set of principal rafters to another; on these are laid the jack-rafters or small rafters to receive the covering.

Pyramid, a structure which, from a square, triangular, or other base, rises gradually to a point.

Q.

Quarter-round, a moulding. See *Ovolo*.

Quoins, stones or other materials, put in the angles of buildings, to strengthen them.

R.

Relievo, signifies the projection of any carved ornament.

Rotunda, a building which is round, both within and without.

Rustic. The term is applied to those stones in a building which are hatched or picked in holes, resembling a natural rough appearance.

S.

Saloon, a lofty, vaulted, spacious hall or apartment.

Scotia, a hollow moulding used in bases to columns.

Section of a building, represents it as if cut perpendicularly from the roof downwards, and serves to show the internal decorations and distribution.

Shaft, the trunk or body of a column, between the base and the capital.

Soffit, the under part or ceiling of a cornice, which is usually ornamented. The under part of the *corona* is called the *soffit*. The word is also applied to the ceiling of an arch, the under side of an architrave, &c.

TEN—ZOC

T.

Tænia, the upper member of the Doric architrave; a kind of *listel*.

Tie-beams, large timbers forming the base-line of a set of principal rafters.

Torus, or *Tore*, a large semicircular moulding, used in the base of columns.

Transom, a piece placed over a door, when there is to be an opening for light immediately over the door. When the opening over is circular, it is generally called an impost.

Triglyph, an ornament peculiar to the Doric frieze.

Truss, or *Brace*, pieces of timber used in framing, to support the middle of any great span.

Tuscan *order*, one of the four orders of Architecture.

Tympanum, the flat surface or space within a pediment.

V.

Vase, the body of a Corinthian capital; also, an ornament used in Architecture, &c.

Vault, an arched roof, the stones or materials of which are so placed as to support each other.

Volute, the scroll or spiral horn, used in Ionic capitals.

W.

Wall-plate, a piece of timber laid on the top of a wall, on which are laid the joists and framing of the roof.

Z.

Zocle, or *Soccolo*, a low square member, which serves to elevate a statue, vase, &c.; also, when a range of columns is erected on one continued high *plinth*, it is called a *Zocle*. It differs from a pedestal, being without base or cornice.